# Do Investors Benefit From MiFID II Unbundling?*

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**ABSTRACT**

One prominent aspect of the MiFID II regulation that became effective in Europe in 2018 is the unbundling of research and execution costs. We exploit the early adoption of an unbundling rule in Sweden already in 2016 to provide evidence on the implications for fund investors. Using a difference-in-difference framework and mostly hand-collected data on bundled and unbundled commissions, we find no economically meaningful effect of unbundling on commissions. When we split the sample into more active and less active funds, using the Active Share measure, we find that fund costs of more active funds increased in relative terms. Finally, we fail to identify improved fund performance or any information gains for investors' fund selection process from the increased transparency of observing execution and research costs separately. Overall, we are skeptical that investors benefited from the unbundling of commissions.

**JEL Classifications:** G11, G23.

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## 1. Introduction

"Until now, asset managers received research, including written reports and phone calls with analysts, for free, although the cost of this service was built into trading fees, which are usually paid by fund managers' clients." (Stafford, 2017)

In ongoing debates of the use of soft dollar arrangements (Di Maggio et al., 2022; Guo and Mota, 2021), a key concern is transparency and agency issues. In January 4, 2018, the Directive on Markets in Financial Instruments (repealing Directive 2004/39/EC) and the Regulation on Markets in Financial Instruments, commonly referred to as MiFID II and MiFIR, were adopted in the European Union (EU). One major change was that external investment research services must be priced separately from execution (so called hard dollars, or unbundling)—aiming for better investor protection through increased transparency and cost efficiency. The adoption alone has had a profound impact on global financial markets (e.g., Anonymous, 2019; Fang et al., 2020; Guo and Mota, 2021; Lang et al., 2019). Yet, there is little empirical or theoretical evidence of the implications of the MiFID II unbundling on mutual funds and, in turn, investors. Bender et al. (2021) discuss in their most recent comprehensive review on soft commissions and research unbundling that studying the MiFID II effect on fund performance and trading costs is a potential question for future research.

We study precisely this question using early evidence from Sweden (cf. Pope et al., 2019), which represents an almost ideal laboratory, as the Swedish Investment Fund Association already in 2016 adopted the accounting method, later known as the Swedish model, where funds had to separate trading costs from costs for sell-side research and analysis. Thus, the Swedish case represents an isolated event of unbundling of commissions with long enough time series information to make statistical inferences. In contrast, when the full regulation came into effect in 2018, the unbundling of commissions was only one of many changes (e.g., best execution, advice in the best interest of clients) potentially affecting mutual funds and their investors.

We hand-collect data from all actively managed equity funds in Sweden with a local investment focus in 2013 to 2018. Funds bundled (unbundled) commissions in the years 2013 to 2015 (2016 to 2018). We also hand-collect bundled commissions for all actively managed equity funds in the US for the same period, thus enabling a difference-in-difference (diff-in-diff) analysis of the separation of payment for research and execution. None of these data are readily available in standard mutual fund databases.

Our main result is a "non-result," as we neither find any evidence for an impact of the separation of research and execution costs on commissions, management fees or total expense ratios (TERs) nor on net fund performance. We use power analysis and Bayesian inference to show that our empirical framework would have been appropriate to detect an effect if such an effect was economically meaningful. However, this result holds for the average fund and, thus, might hide some important cross-fund variation. One important dimension to consider is the level of activeness, proxied by the Active Share measure, as it is closely related to a fund's exposure to research and trading costs. For high-ActiveShare funds, unbundling led to mostly statistically significant and economically sizable increases in commissions, management fees and TERs relative to low-ActiveShare funds in Sweden and high-ActiveShare funds in the US. In contrast, unbundling led to a significant drop in management fees and TERs for low-ActiveShare funds.

One interpretation of this result is that expenses were shifted from nontransparent, bundled commissions before the event to management fees and total expense ratios after the event in the case of high-ActiveShare funds. This mechanism, however, does not explain the contemporaneous drop in the fees of low-ActiveShare funds that we observe in the data. This suggests that, before the unbundling, low-ActiveShare funds were potentially cross-subsidizing (cf. e.g., Ben-Rephael and Israelsen, 2018; Eisele et al., 2020) high-ActiveShare funds within the same fund management companies in terms of commissions, making, on average, low-ActiveShare (high-ActiveShare) funds more (less) expensive than they should have been. As a consequence, once research and trading costs had to be explicitly accounted for at the fund level, high-ActiveShare (low-ActiveShare) funds became more (less) expensive.

While we consider this mechanism to be plausible, it can only be part of the explanation, as the wedge between high and low-ActiveShare funds in management fees and TERs exceeds commissions in magnitude. We conjecture that part of the wedge can also be attributed to an increased awareness of fund costs among investors in response to the public debate and general discussion around the unbundling.

When it comes to mutual fund performance, net of fees, we find no positive impact of unbundling and no variation across funds with different levels of activeness. Overall, these results have to be interpreted cautiously because it is well-known that performance measures are noisy and the time-series dimension that we rely on is short. Still, the picture is rather bleak, as we are unable to empirically identify positive effects of unbundling for investors, on average. The only somewhat positive consequence is that management fees and TERs of funds with low Active Share dropped. Unfortunately, this reduction in costs was not reflected in net performance during our sample period. On the other hand, in the case of funds with high Active Share the results indicate that funds profited from the regulatory shock through an increase in fees and, as a consequence, fee-related revenues.

From a fund investor's perspective, the value of any increased transparency from separating previously bundled commissions appears to be limited in our data. Upon exploring further the information content within separated research and execution payments in Sweden, we find a weak relationship and mostly erratic patterns between costs for execution and performance. In fact, we find that at the time of the adoption of MiFID II in 2018, the great majority of fund families re-allocated investment research to their profit and loss (P&L) statements instead—an option that MiFID II explicitly grants to the funds. In that setup, fund management companies, at least, still receive explicit prices for research services upon the unbundling of commissions. But, transparency for fund investors does not improve and is still limited because investors do not observe the extent to which a given fund uses sell-side research and the costs the fund pays for it.

Our paper makes three contributions. First, to the best of our knowledge, there is no empirical evidence on the impact of separating research from execution costs on fund investors, even though MiFID II prominently discusses and targets corresponding conflicts of interest between asset managers and their clients (Guo and Mota, 2021). The related literature has so far focused exclusively on the consequences for sell-side research providers (Anselmi and Petrella, 2021; Bankamp et al., 2021; Fang et al., 2020; Fecht et al., 2021; Fu et al., 2021; Guo and Mota, 2021; Kim et al., 2021; Lang et al., 2019; Liu and Yezegel, 2020; Lourie et al., 2020; Pope et al., 2019). Given the original motivation for the regulation, studying the impact on

fund investors, however, seems particularly relevant for ongoing debates among academics, policy-makers and practitioners about the costs and benefits to unbundle payments (Di Maggio et al., 2022). For example, the EU has decided to exempt small and medium-sized fund management companies from the unbundling rules (so called "rebundling," Bender et al., 2021), and the US has stated a no-action letter in order to assess developments in the EU (Guo and Mota, 2021), set to expire July 3, 2023 (Lourie et al., 2020).

Second, our study contributes to the literature on hidden fees (e.g., Busse et al., 2021; Edelen et al., 2012, 2013; Livingston and Zhou, 2015), as we show that commissions are lower than previous estimates but still sizable (even before research payments were reallocated), and greatly differ between funds (cf. Carlin, 2009; Cooper et al., 2021; Philippon, 2015). What is more, in our empirical data, Swedish funds investing in Sweden had average hard dollar research payments of 2.7 bps per trade.[3] In the US, where soft dollars are still used, recent research by Di Maggio et al. (2022) estimates that fund managers would be willing to pay 3 bps per trade for research if they had to pay hard dollars.

Third, having access to actual payments of research and execution separately further enables us to analyze the overall effects on fund performance. We thus contribute to the debate of whether premium brokerage services are related to better (see Livingston and Zhou, 2015) or worse (Edelen et al., 2012) fund performance and whether trading activity or efficiency are related to better (Cici et al., 2018; Pástor et al., 2017) or worse (Bogle, 2014; Busse et al., 2021; Dyakov et al., 2020; Edelen et al., 2013; Odean, 1999) fund performance. As discussed before, our empirical evidence that is based on reported values rather than inferred values, as in the earlier literature, suggests that the performance consequence of both, execution as well as research costs, are negligible for the average fund.

The rest of the paper is organized as follows. Section 2.1 gives a background to the MiFID II framework and describes the Swedish fund market. We develop the conceptual framework in Section 2.2. Empirical design and data are described in Section 3. In Section 4, we show the results. Section 5 concludes.

## 2. Conceptual Framework

### *2.1. MiFID II and the Swedish Model*

In the aftermath of the financial crisis in 2008, the legislative framework of MiFID in the EU was revised in order to regain confidence in the industry. The MiFID II regulation explicitly mentions that "an investment firm should ensure that the cost of research funded by client charges is not linked to the volume or value of other services or benefits or used to cover any other purposes, such as charges for execution" (Article 27, Directive 2017/593/EU suppl. Directive 2014/65/EU). According to MiFID II, mutual funds that are sold in Europe can pay for research services that are provided by third parties, either out of the fund family's own resources (through the P&L statements of fund management companies) or from a separate research payment account visible to investors.[4] During a transition period, mutual funds sold in Europe have been

[3] We calculate the research payments per trade as the *Execution Costs per Trade* $\times$ *Execution Ratio* $^{-1}$ $\times$ *Research Ratio*: $5.33 \times 7.73^{-1} \times 3.92 = 2.70$.

[4] The costs of research and execution taken from the client's resources should be reported in the key investment documents.

exempt from the rules.

Sweden, however, has been one of the earliest adopters. The Swedish Investment Fund Association already in 2015 guided, through the "Kod för fondbolag", mutual funds to separate research from execution using what they referred to as the accounting method: costs for research services are made visible to investors by reporting them together with the ongoing charges (total expenses less performance based fees). Both costs for research services and execution costs, unbundled, are reported in the year-end fund annual reports.[5]

The early adoption in Sweden provides a unique opportunity to gain insights into the impact of actual unbundled commissions of funds on costs that fund investors face and the performance they receive. Sweden has a large and well-developed fund market, and serves as a representative fund market to study (see e.g., Ferreira et al., 2013). The size of the Swedish fund market is top 10 in the world when it comes to total assets under management relative to gross domestic product (GDP), at 31.1% in 2001 (Khorana et al., 2005). In 2020, it was 91.3%, and thus slightly smaller than the US at 140%.[6] The relative size of the Swedish equity fund market to GDP was similar also to that of the US market in 2015 (Ibert et al., 2018).

### *2.2. Development of Research Questions*

Several recent studies investigate the effect of the introduction of MiFID II unbundling on the sell-side. The papers, summarized in Table 1, show that the quantity of sell-side research has dropped, while sell-side quality has increased, and overall market liquidity has decreased. Results are mixed about the impact on the overall information environment.

*Insert Table 1 about here*

The above results, however, do not address the question whether investors, in the end, benefit from the new legislative framework, through (a) a reduction in fees and investment costs; (b) an increase in fund performance; or (c) an increase in transparency that might guide investors in their fund selection. These are the questions we are focusing on in this paper. What is the impact of unbundling commissions on fund behavior, and in turn, investor protection? Specifically, (a) what is the impact on fund cost and returns; and (b) what is the value of the increased transparency?

MiFID II unbundling might influence mutual fund fees through the following two channels. First, MiFID II has brought the importance of fund fees and investment costs to the forefront of the public debate, potentially making investors more aware of their mere existence and their impact on performance. This might lead to an increase in price competition among funds. Second, unbundling makes trading costs and research costs more transparent and may explicitly allow investors to compare these costs across funds and to potentially use them in the fund selection.

[5]In the MiFID II definition of transaction fees, an implicit execution cost is to be calculated, whereas funds in Sweden were guided to report explicit costs in their year-end reports.

[6]The Swedish fund market had 518,243 million (USD) total net assets in open-end funds (Investment Company Institute, 2021, p. 275) and the GDP was 567,864 million (USD) (OECD, 2021), compared to the US at 29.3 trillion (USD) (Investment Company Institute, 2021, p. 1) divided by 20,936,600 million (USD) (OECD, 2021).

Overall, (a) increased awareness and (b) possibility to compare costs among investors would thus induce fund managers to pay more attention to their cost efficiency. If funds, in the past, used non-disclosure opportunities, such as bundling of commissions, to hide fees (Busse et al., 2021; Edelen et al., 2012, 2013; Livingston and Zhou, 2015), they were less cost efficient than they could have been. But, there is also empirical evidence of surprisingly high dispersion in—non-hidden—fees (Cooper et al., 2021; Philippon, 2015). If mutual fund investors are largely insensitive, or do not pay attention, to high fund costs (Barber et al., 2005; Hirshleifer, 2015), disclosing previously hidden fees should have no impact on fund investor behavior and, thus, on mutual fund costs. Alternatively, fund managers value investment advice and would keep paying for research with hard dollars (Di Maggio et al., 2022). However, empirical evidence of the decrease of quantity of sell-side research (Anselmi and Petrella, 2021; Fang et al., 2020; Guo and Mota, 2021; Lang et al., 2019; Pope et al., 2019) suggests that fund managers have already started paying attention to and cutting back on these costs of research after the unbundling. Whether these activities have also resulted in lower costs and better performance for fund investors, remains an open question and will be tackled in the paper.

Moreover, fund managers' careers are largely influenced by their fund performance (Barber et al., 2017), that goes into the rankings that mutual fund investors care about (Ben-David et al., 2022; Guercio and Tkac, 2008). With quantifiable, unbundled costs for research, fund managers are better equipped to judge if the return from research outweighs the costs of obtaining it. Even if research is paid for ex ante, the supply of sell-side research is limited and fund managers have plenty of opportunity to learn what research is valuable (Jackson and Zhang, 2020), now that there is a price tag attached to it. Empirical evidence indicates that fund managers have judged that less research outweighs their costs now that it is separately priced, given the reduction in sell-side research quantity (Anselmi and Petrella, 2021; Fang et al., 2020; Guo and Mota, 2021; Lang et al., 2019; Pope et al., 2019). Thus, fund managers are also hypothesized to reduce commissions when these are unbundled to keep fund costs at a minimum and maximize fund performance.

Disclosure further plays an important role in mitigating agency conflicts (e.g., Edelen et al., 2012), in this case between sell-side and buy-side (and, in turn, the end clients). When sell-side research is compensated through sell-side trades, there are (misaligned) incentives for sell-side analysts to generate trades rather than to generate high-quality research (Brown et al., 2015; Irvine, 2004; Karmaziene, 2016). Fund managers even decide how to allocate commissions among brokerage firms based on the research service rather than the trading service (Ljungqvist et al., 2007). Most academic literature has found that soft dollar arrangements result in agency conflicts (Bender et al., 2021). Empirical evidence shows that misaligned incentives have been reduced through MiFID II (Lourie et al., 2020), also indicated by the increase in quality in sell-side research (Bankamp et al., 2021; Fang et al., 2020; Guo and Mota, 2021; Lang et al., 2019; Pope et al., 2019)—albeit tipping still remains (Ludolph, 2021) and banks might instead steer their recommendations to private investors more opportunistically (Fecht et al., 2021). Still, as there is less trade-generating research and more high-quality research, funds are hypothesized to spend less on execution that is detrimental for fund performance. Even if fund managers previously were insensitive to trade-generating research and were choosing brokers that best executed trades, they still had to pay for trade-generating sell-side research

(that possibly other market actors used) when research services were bundled with trading costs. Thus, fund performance, gross of fees, could be negatively affected by the bundled commissions regime. If these inefficiencies and distortions are removed with MiFID II, we expect again that fund costs decrease and fund performance, even gross of fees, improves in response.

Proponents of the soft dollar arrangement argue that research is a public good that benefits all. Thus, upon unbundling commissions the markets will be less informed and investors are harmed. But from a mutual fund's perspective, if markets are less informed the potential to create alpha through active fund management (e.g., with fundamental valuation) should increase. Thus, even if unbundling leads to the loss of a public good, if anything the effect on fund performance ought to be opposite (i.e., it provides more investment opportunities).[7] However, when MiFID II came into effect, the resulting low coverage of small and medium-sized enterprises, combined with the pandemic, has led the EU to allow "rebundling"of commissions (Bender et al., 2021).

In all, we expect that fund performance improves in response to the new legislative framework through better cost efficiency and mitigation of misaligned incentives. So far, empirical evidence is limited to the effect of MiFID II and unbundling of commissions on sell-side. It is thus unknown if investors are really better off, although conceptually they ought to be.

The new legislative framework might not only impact fund managers but also mutual fund investors in other ways than pressuring cost efficiency and mitigating misaligned incentives. The increased cost transparency could also be beneficial for investor decisions regarding fund investments if trading and research costs help identify cross-sectional differences in fund performance and ratings.

With respect to trading costs, the empirical evidence on the relation between trading and performance is mixed (see, for example, Busse et al., 2021; Edelen et al., 2012, 2013; Haslem, 2006; Livingston and Zhou, 2015). Pástor et al. (2017) argue that funds tend to trade more when there are more profit opportunities. Cici et al. (2018) document that funds that are managed by fund families which utilize effective trading desks significantly outperform funds with less effective fund family trading desks, but execution efficiency also differs within management companies (Ben-Rephael and Israelsen, 2018). Meanwhile, in a recent study Dyakov et al. (2020) find that mutual funds, internationally (in sixteen domicile countries) and in the aggregate, lose money on their trading.

With respect to sell-side research, several papers have documented that this type of research can be valuable (see, for example, Asquith et al., 2005; Birru et al., 2022; Di Maggio et al., 2022; Jegadeesh et al., 2004) but actual trading strategies tend to fail to offset any associated trading costs (Barber et al., 2001; Kacperczyk and Seru, 2007). US fund managers whose portfolio changes were less correlated with sell-side recommendations had better fund performance according to Kacperczyk and Seru (2007).

Disentangling the effect of trading costs and the effect of research costs on fund performance has not previously been possible, since payments for execution also included research services such as access to

[7]More specifically, the fund performance gross of fees could benefit from this mechanism if fund managers are skilled enough to exploit those inefficiencies. Note, however, that fund managers would not necessarily be willing to share those performance gains with fund investors according to equilibrium models of asset management.

research reports (Livingston and Zhou, 2015) or access to companies (see e.g., Switzer and Keushgerian, 2013) in the bundled commissions' regime. Livingston and Zhou (2015) show that bundled commissions per trade are positively associated with fund performance, whereas expense ratio, turnover ratio and bundled commissions per fund size are not. They argue that brokerage houses that provide premium services charge higher bundled commissions per trade than those brokerage houses that only offer execution. This implies that if commissions were unbundled, investment research services alone should have had a positive effect on fund performance. Previous research has not been able to explore those relationships beyond speculation because the costs have been hidden and bundled—MiFID II has now changed that and we will explore this research question in the paper.

## 3. Empirical Framework

### *3.1. Empirical Design*

To empirically test the effect of unbundling of commissions, we employ a diff-in-diff strategy. The treatment group consists of actively managed open-end funds in Sweden that invest in Swedish equity. These funds have, following the early adoption of MiFID II, unbundled the payment for research and execution starting in 2016.[8] An additional benefit of using the early adoption in Sweden is that we can relate any effect to the unbundling of commissions, as opposed to the effect of MiFID II that includes other legal changes as well (e.g., best execution, advice in the best interest of clients).

The control group consists of actively managed open-end funds in the US that invest in US equity. We choose the US for several reasons. First, other studies on the implications of MiFID II have used US mutual funds as the control group making (a) our study comparable and (b) supporting that US funds represent a proper control group (i.e., not affected by the treatment). Second, the US environment with the soft dollar arrangements (i.e., bundled commissions) is comparable to the pre-MiFID II situation in Europe. Finally, the SEC's governance provides opportunities to access high-quality data.

The identifying assumption is that, in the absence of MiFID II, commissions of the treatment group and the control group would have maintained a parallel trend. However, in response to the MiFID II regulation—if it has the intended impact on the asset management costs—we expect to observe a drop in commissions for the treated group.

To analyze the effect of unbundling commissions, we employ the following empirical strategy,

$$Y_{it} = \beta_1 (Treat \times Post)_{it} + \beta_2 X_{it} + \alpha_i + \alpha_t + \epsilon_{it} \tag{1}$$

where, $Y_{it}$ denotes the costs, including commission, management fee, and TER, a fund's trading activity, measured as turnover, and performance, measured as alpha, Sharpe ratio, fee revenue, and abnormal return

[8] We limit the analysis to a local focus, because previous research shows a large impact of the Swedish model on sell-side in the post-adoption period (Pope et al., 2019), whereas other research shows an effect in 2018 (the year of MiFID II adoption) in the rest of EU.

of fund $i$ in year $t$. $Treat \times Post_{it}$ is the isolated effect of the unbundling of commissions, where $Post_t$ is one in 2016-2018 and zero in 2013-2015[9], and $Treat_i$ is one for the treated group (SE funds) and zero for the control group (US funds). $X_{it}$ denotes a control variable that is the natural logarithm of the total net assets (TNA). Finally, we include fund and time fixed effects and estimate robust standard errors clustered at the fund-level.

We require observations in both periods among our $SE$ and $US$ samples, to ensure that any effect is driven by the unbundling and not changes in compositions of the samples. The selection of start and end years reflects a compromise between the manual collection effort of the data and the construction of a long enough time series for the diff-in-diff framework. It is important to highlight that even though total fund commissions (i.e., commissions for trading as well as for research) are important costs in asset management, they are not easy to observe, as they are not available in any of our standard databases. Thus, Section 3.2 will explain in detail our data collection efforts.

Finally, to evaluate transparency effects of the unbundling of commissions we focus on the *Post*-period in Sweden where we also have separate information on research and execution payments due to the unbundling. Since all funds in Sweden were required to report unbundled commissions, we collect data for funds with a non-local focus as well.[10] We refer to the supplemental Swedish sample with a local focus as $SE - L$[11] and the ones with a foreign focus as $SE - F$. To address whether the increased transparency helps fund investors, we study the relationship between fund performance and unbundled commissions.

### *3.2. Data*

An important contribution of our paper is the elaborate, largely manual data collection effort that is required to investigate the impact of the unbundling of research and execution costs on fund investors. In the following sub-sections, we describe each data set that we will use in the empirical analysis.

#### *3.2.1. Sample of Swedish Funds.*

Our data on actively managed open-end funds in Sweden that invest in Swedish equity—the main sample of Swedish funds—come from Morningstar and fund annual reports. While collection of Morningstar data is straight-forward, the collection of fund annual reports requires hand-collection through fund websites and direct contact with fund management companies. Furthermore, there is no standard format of the fund annual report and thus values in the report had to be manually compiled into a dataset (see Section 6 for accessibility of the dataset).

From Morningstar, we get a list of open-end Swedish equity funds, and the monthly time series of fund net returns, TNA and benchmark net returns.

[9] As suggested by Angrist and Pischke (2009), we split the post dummy into individual year dummies in robustness tests to ensure that we capture any treatment effects accurately.

[10] We only collect this in the post-period, for the reasons of clean effect of unbundling mentioned above but also because of how time-consuming it is to hand-collect data of this kind.

[11] The $SE - L$ sample is larger than the $SE - Post$ sample, because we do not require observations in the pre-period.

From the fund annual reports, we collect the year-end reported payments of bundled commissions for the period 2013-2015. Starting in 2016, we observe separate research payments, execution payments and execution fees (referred to as *Execution Costs per Trade*).[12] Furthermore, we extract information on turnover, management fee, ongoing charges, and (year-end) TNA for the full sample period, 2013-2018, from the reports. Finally, we collect the Active Share measure, relative to funds' benchmark indices, based on reported values in the fund year-end report of 2016.

For the empirical analysis of the link between fund performance and information on execution and research costs that has become available after the introduction of the new regulation, we use a supplemental sample of Swedish funds. The supplemental sample includes the main sample of Swedish funds but also Swedish funds with local investment focus that only have observations in the post-period, 2016-2018. The data collection process for this sample is identical to the one described above but we collect some additional control variables, namely fund age, a dummy whether funds invest in emerging markets, and a dummy whether funds are managed by banks.

*3.2.2. Sample of US Funds.*

Our data on actively managed open-end funds in the US that invest in US equity come from Morningstar, CRSP and the fund annual reports. While collection of Morningstar and CRSP data is straight-forward, the collection of fund annual reports, not available in any database (e.g., Edelen et al., 2012), requires hand-collection of N-SAR and N-CEN reports from the SEC Archives and scraping relevant items from the collected reports. Details of the data collection from the SEC archives and the US sample construction are given in Appendix A and code/data repositories are described in Section 6. Specifically, filings are made at the central index key (CIK) level (where each CIK can include multiple funds) but henceforth we refer to our clean CIK level sample as the main sample of US funds (and provide robustness checks and motivations in the E-companion and Appendix, respectively). We also want to emphasize that we have written tailored machine algorithms (now openly available) to browse through SEC archives and to access specific items in the relevant N-SAR/N-CEN reports.

To summarize, from Morningstar, we get a list of open-end US equity funds and monthly time series of benchmark net returns. From CRSP, we collect monthly time series of fund net returns and TNA, and yearly time series of turnover, management fee, TER and TNA. From the fund annual reports (N-SAR/N-CEN), we collect the year-end reported payments of commissions and fund classifications (debt, foreign, equity, metals, balanced, and index).

Finally, we compute the Active Share measure based on the database made available by Cremers (2022), using the S&P500 as the comparison benchmark, and collecting the year-end values of 2016. We aggregate the Active Share to the CIK-level by taking the average.

[12] If a fund reports unbundled commissions already in 2015, we use the sum as bundled commissions. Results are similar if we code these cases as being treated in 2015.

*3.3. Measurements*

Our main results focus on total commissions, the sum of brokerage commissions for trading and commissions for research. Obviously, before the regulatory shock these commissions cannot be disentangled because they are bundled and thus our diff-in-diff analysis focuses on the sum of the unbundled commissions also after the event. We normalize the commissions by dividing year-end payments by year-end TNA. We also study the effects of unbundling of commissions on TER[13], management fees[14], and turnover. Post the event, TER also includes research payments that before the event, and in the control group, are bundled with commissions for execution and not included in TER.

To estimate fund performance, we use four different proxies. For all performance measurements we use the 12 months in that year and require complete observations. First, we estimate the (1-factor) alpha by taking the monthly net returns and regressing them on monthly benchmark returns. Second, we estimate the Sharpe ratio as the fund return in excess of the risk-free rate and divide it by its standard deviation. Third, we estimate the fee revenue as the average of the lagged monthly TNA times TER divided by 12. Fourth, we estimate the abnormal return as the cumulative log monthly net return in excess of the monthly benchmark net return.

We use the MSCI monthly net return benchmark index in local currency, matched with the investment focus of the fund. For Swedish funds, we use MSCI Sweden SC for small cap funds and MSCI Sweden for the others[15], we use MSCI USA for the US funds throughout. For the $SE - F$-sample, i.e., those Swedish funds that invest globally, we manually examine fund websites, fund annual reports and/or fund prospectus to match appropriate benchmarks with funds. When in doubt, we use a similar approach to that of Petajisto (2013). In total, we use 46 unique MSCI indices.

Finally, for the risk-free rate of return, we use the 1-month US Treasury Yield.[16] Detailed definitions of variables are available in Table 2.

*Insert Table 2 about here*

*3.4. Summary Statistics*

We start by assessing the validity of the parallel trend assumption, by visually inspecting, in Figure 1, the mean dependent variables of interest and their confidence intervals over time. We see very similar trends, especially before the event date.[17] One notable exception is the fund performance, where we find a sizable positive outlier in Sweden in 2015 for alpha and abnormal return. The fee revenue similarly is developing

[13]Funds in the EU (US) report ongoing charges (TER). The main difference is that ongoing charges exclude performances fees. In practice, these measurements are the same because less than 2.5% in our supplemental sample report any performance fees. We thus refer to the ongoing charge as TER.

[14]In the US, the management fee mainly consists of the advisory fee to the fund managers. In Sweden, the management fee also includes the legal fee, the accounting fee, the audit fee and the custodial fee. In both countries, the management fee does not include distribution and service fees, registration fees or costs for external advice.

[15]Results are unaffected using only MSCI Sweden for all Swedish funds.

[16]Results are unaffected using the Swedish treasury for the Swedish funds.

[17]Both the Swedish and the US markets experienced negative Sharpe ratios in 2018: -2.21 and -1.65, respectively.

differently in Sweden (note that magnitudes are in local currencies), mainly as a result of the increasing assets under management. Finally, in the case of turnover, the trends before the event seem to be different. While we find an increase in turnover for the average US fund, we find a decrease for the average Swedish fund. Most importantly, however, pre-event trends in our main variables of interest (commissions and fund costs) seem to be very comparable across samples.[18]

*Insert Figure 1 about here*

We present summary statistics of our data in Table 3. Panel A shows the results for the main sample of Swedish funds. In the post-period, average commissions, management fees, TERs and turnover drop. The changes are only marginally significant ($p < .1$).

*Insert Table 3 about here*

Panel B shows the same set of results for the main control sample of US funds. In the post-period, there are no significant changes in any of the dependent variables. If anything, the changes are marginally opposite from the sample of Swedish funds.

Panel C shows the supplemental sample of Swedish funds in the post period. For funds investing in Sweden ($SE - L$), the research cost ratio is higher, the execution cost ratio is lower and the execution cost per trade is lower compared to funds investing outside of Sweden ($SE - F$). Management fee, TER and turnover are also lower when funds are investing in Swedish equity. Theses differences are statistically significant.

While commissions might appear to be small in relative terms, being between 6 and 13 basis points in our samples, they do add up to sizable amounts in absolute terms. The 190 actively managed equity funds in Sweden in our sample data paid 310 million SEK in 2016-17 and 50 million SEK in 2018 (about 5-35 million USD per year) for external research and 520 million SEK, 650 million SEK and 730 million SEK in 2016, 2017 and 2018 respectively (about 60-85 million USD per year) for trading in the post-period.[19] Among the about 70 Swedish funds that invest in Swedish equity, the cumulative amount spent on total commissions was between 250-340 million SEK per year in 2013-2018 (about 30-40 million USD). In the US, the about 900 CIK-level series, or 8,000 fund series, or 30,000 fund share classes, paid about 3 billion USD per year for commissions, with the lowest amount in 2018 of 2.2 billion USD.

We then turn to the fund performance. Table 4 provides summary statistics. Panel A shows the main sample of Swedish funds. In the post-period, average alphas, Sharpe ratios, and abnormal returns drop. All changes are statistically significant. The fee revenue is opposite and higher in the post-period, as was already mentioned before.

[18] In Table 6 we present dynamic coefficient regressions of the interaction between year dummies and the treatment variable (SE). In the E-companion, in Figures C.4-C.5, we illustrate trends for the unfiltered sample (that includes all open-end US funds) and the forgiving sample (that excludes filings that contain at least one fund series that invests in foreign equity or metals in the pre-period), respectively.

[19] In Section 4.4, we address the drop in payments for external research in 2018.

*Insert Table 4 about here*

Given the average levels of commissions we would not expect a large impact on fund performance due to a direct cost reduction argument. However, it could well be that the return consequences of the unbundling are larger than the pure reduction in commissions, if fund managers, as a consequence, execute fewer trades induced by misaligned incentives between fund managers and sell-side research providers, or if research quality, in general, increases in response to receiving an explicit price tag.

Panel B shows the main sample of US funds. In the post-period, the Sharpe ratio drops. The change is statistically significant with a p-value below 1% and is mainly driven by the market drop in 2018. There is no statistically significant change in alpha, fee revenue, or abnormal return.

Panel C shows the supplemental sample of Swedish funds in the post-period. For funds investing in Sweden ($SE-L$), the average Sharpe ratio is lower whereas the average abnormal return is higher compared to funds investing outside of Sweden ($SE-F$). These differences are statistically significant ($p < .01$). Funds investing in Sweden have a higher alpha that is weakly significant ($p < .05$), but there is no significant difference in fee revenue.

Finally, we visually explore the time-series dynamics of our main variables such as total fund costs and unbundled commissions. Figure 2 shows that total fund costs appear to stay relatively stable on a year-by-year basis—for funds investing both in Sweden ($SE-L$) and outside of Sweden ($SE-F$). However, we notice an interesting pattern in 2018 for both groups: the research payments suddenly drop substantially. We address the drop in research payments in 2018 in Section 4.4.

*Insert Figure 2 about here*

## 4. Results

### *4.1. The Impact of Unbundling on Fund Cost Efficiency*

The main research question addressed in the paper is the impact of the unbundling of research and execution costs on fund investors. We first look at the overall effect of unbundling on fund costs in Panel A of Table 5.

*Insert Table 5 about here*

For commissions, the coefficient of the interaction term $SE \times Post$ is small in economic terms, estimated to be 1.9 bps, and just not significantly different from zero ($p = 0.122$). Interestingly, the sign of the effect is also opposite to our hypothesis and to the ambition of unbundling commissions to lower them. Commissions are, in general, higher in Sweden than in the US, as can be seen from Table 3[20], and they are lower for larger

[20]Given that we estimate panel regressions with fund fixed effects, the impact of being in Sweden on all dependent variables is subsumed in those fixed effects and cannot be separately identified in the regressions. In the E-companion, we also report pooled OLS and random effect models.

fund sizes, as one would expect. Thus, we cannot reject the null hypothesis that fund managers are paying as much for research and execution when these are bundled as when these are unbundled.

Our result is somewhat surprising. Possibly, fund managers did not react to the increased transparency because they, as well as fund investors, perceive commissions to be too small to care about. Alternatively, it could also be that fund managers find sell-side research valuable to pay for. This, however, appears to be at odds with existing evidence that sell-side research came under pressure and that the quantity of research produced decreased in response to the unbundling. However, the nature of sell-side research could have changed and, in particular, the quality could have increased leading to higher prices for the research, such that total payments remain unchanged. This explanation also has implications for fund performance, which we will evaluate in detail later. Furthermore, there could have been some substitution effects, in the sense that broker-dealers increased their prices for trading to compensate for the lower demand for sell-side research.

Next, we look at management fees (explained in Section 3.3) that were not explicitly targeted by the unbundling but still could have been used by fund management companies to respond to the changed cost environment. Table 3 shows that, in general, Swedish funds have higher management fees than US funds. Furthermore, management fees have in both groups decreased over time (see the significantly negative coefficient of the *Post*-dummy variable in the model using random effects, in Table C4 in the E-companion). Our empirical results also suggest that management fees dropped more in Sweden post the event. The coefficient estimate implies a decrease of almost 5 bps but is not precisely enough determined to have statistical significance at standard levels (the p-value is $p = 0.142$).

Finally, for TER, that ultimately captures the costs investors face when investing in mutual funds, the overall pattern is similar to that of management fees (i.e., TER is higher in Sweden and decreases over time in all samples) with the important difference that there is no effect in response to the unbundling of commissions. Note, however, that in the post-event period, the TER in Sweden also includes research payments. If a fund (management company) cares about keeping the TER at a constant level, lowering the management fee is the only way to do that when research payments are added into the TER after being unbundled from execution costs. From the summary statistics, we know that average research ratios in the post-period for Swedish funds are 3.9 bps, in close proximity to the estimated coefficient (i.e., 4.6 bps) we found in the case of management fees.

Given that the unbundling of fees also made execution costs more salient, we hypothesized before that funds might adjust their trading activity in response. When we use turnover as a dependent variable in Panel A of Table 5, however, we find no statistically significant effect of the event on turnover. While there appear to be no systematic differences in trading activity between Swedish and US funds (see Table 3), we find some evidence that larger funds trade less, as one would expect.

One potential concern regarding the above results and their lack of significance is that we inaccurately time the treatment effect and, simply speaking, miss it. To mitigate this issue, Table 6 shows a more detailed assessment of time-varying effects by interacting the SE dummy with individual year dummies. Panel A shows the results for commissions, management fees, TERs and turnover. Across all dependent variables,

the results show no evidence of treatment effects during any year before, capturing anticipation, or after the regulatory change. The only marginally significant coefficient, albeit going in the wrong direction, is a positive one on commissions for Swedish funds in 2017.

*Insert Table 6 about here*

Given that our main result is a non-result, it is important to evaluate whether our empirical framework has sufficient statistical power to reject the null hypothesis when the alternative hypothesis is true. Given that unbundling specifically targets commissions, we focus on the null hypothesis of "unbundling having zero effect on commissions"in the subsequent discussion, following Jegadeesh et al. (2019).[21]

From Table 5 we calculate the standard error of the treatment effect as being 1.25 bps (i.e., 0.019/1.550 = 0.012)[22]. Assuming a decision criterion of 5% (i.e., probability of making a type I error), we can calculate the threshold treatment effect, that would allow us to reject the null hypothesis, to be at 2.4 bps (standard error $\times$ $t$-statistic: 0.012 $\times$ 1.96).

Figure 3 illustrates the power of our test for different levels of (potentially) true effects. At a power level of 80% that is frequently considered to be adequate in the literature (see, for example, Ioannidis et al., 2017), we should detect a true effect of 3.5 bps or higher.[23] Given that average commissions in Sweden in the pre-period were 12.7 bps (see Table 3) we consider a treatment effect of around 3.5 bps to represent a reasonable size.

This analysis shows that our empirical framework has sufficient power characteristics to detect reasonably-sized effects of unbundling on commissions. Of course, the analysis also illustrates that if the regulatory change had a very small impact on commissions, we would be unlikely to detect such an effect. To do so, we would have to increase the power of our tests. One way to achieve this is to collect additional data. However, this strategy would not work well, as the natural experiment setup in Sweden is unique, to our knowledge, and, therefore, we are not able to extend the data in the cross-section.

*Insert Figure 3 about here*

In sum, we find no evidence of the anticipated effect of the regulation on commissions, on average. There is also no effect on the frequency of trading. However, we do find a remarkable, albeit small and statistically insignificant, reduction in management fees that seems to be similar in magnitude to the research costs. Since the TER in Sweden post the event also includes research payments, we reason that some funds tried to keep their TER unchanged by adjusting management fees accordingly.

### *4.2. The Impact of Unbundling on Fund Performance*

Overall, the results of the previous section imply that fund investors did not benefit from the unbundling of commissions on the cost side. Next, we will evaluate whether they experienced some positive effects on the

[21] In the Appendix B, we also estimate the probability that the null hypothesis is true using Bayesian inference.
[22] Under the null hypothesis, $\beta = 0$ and thus *t-statistic* $= (\hat{\beta} - 0)/$standard error $\leftrightarrow \hat{\beta}/$*t-statistic* $=$ standard error.
[23] Assuming a decision criteria at 10%, the threshold is 2 bps and we should detect a true effect at around 3 bps.

performance side in Panel B of Table 5. For fund alphas as well as abnormal returns, the regression results indicate a positive effect during later years while Table 4 hints at positive effects for Swedish funds. However, interestingly, there is a negative and significant effect for the interaction term $SE \times Post$, suggesting that after unbundling of commissions, performance deteriorated in Sweden. For the Sharpe ratio, the results are similar except that Sharpe ratios dropped in the post-period (recall from Section 3.4 that both SE and US markets had weak Sharpe ratios in 2018 and that the SE market performed worse than the US market).

The empirical evidence on deteriorating performance is surprising. Given that one motivation for the unbundling of commissions is to remove the negative effects of conflicts of interest and misaligned incentives in the bundled framework, we would expect to find a positive effect on performance; or a non-effect if those frictions are not as severe as originally believed. One potential explanation for the negative result could be related to the negative consequences that the unbundling of commissions had on the production of sell-side research as documented in the literature. Some funds could have stopped using valuable sell-side research which actually ended up in worse performance. We will come back to this explanation when explicitly studying reported research expenses and their association to fund performance.

For our performance measure from a fund's perspective, fee revenue, results have to be interpreted with care because fee revenue is measured in local currency to avoid that time-series variation in the SEK-USD exchange rate affects our empirical results. Time-invariant currency effects will be captured by the fund fixed effects. Interestingly, coefficients on the interaction term are positive and statistically significant indicating that Swedish funds became more profitable after the event. Given that there is no difference in TER, as discussed before, this result is driven by an increase in assets under management in the $Treat$-group post the unbundling (that can also be seen in Figure 1).

As before, we assess whether the timing of the Post dummy plays a role in the above results by looking at dynamic coefficient estimates in Table 6, Panel B. We find statistically significant positive effects across all dependent variables in pre-event years. While this could indicate that fund performance has improved in anticipation of the positive impact of unbundling, we are sceptical about this interpretation. First, the anticipation effects would have to be very long-lasting, as positive effects are not just observed in the year before the event. Second, coefficient estimates in post-event years suggest consistently worse performance, with the exception of fee revenues that continued to improve after the unbundling.

In sum, the empirical evidence suggests that the performance of Swedish funds suffered in the $Post$-period, looking at abnormal returns, Sharpe ratios and alphas. Thus, there is no evidence of better performance in response to unbundling commissions. However, there is evidence that funds in Sweden became more profitable in the Post-period, looking at their fee revenues. Since performance was worse and TER was lower or unchanged, the effect has to be driven by an increase in assets under management—funds must have attracted more capital from investors in response to the increase in transparency.

### *4.3. Heterogeneous Effects of Unbundling*

The result that the unbundling of commissions in Sweden had only a very small impact, if at all, on commissions, fees and performance for the average fund might hide a lot of variation across funds. One obvious dimension to consider in this context is the level of activeness following Di Maggio et al. (2022), who

argue that heterogeneous demand for research is expected for active equity funds, index funds and hedge funds. As a proxy for fund activeness, we use the *Active Share* measure proposed and discussed in Cremers and Petajisto (2009) and Cremers et al. (2016). Active share measures the percentage of fund holdings that are different from the benchmark holdings.

To test if the unbundling of commissions had heterogeneous effects depending on the activeness of the fund, we perform the following triple-difference regression (with a 3-way interaction):

$$\begin{aligned} Y_{it} = \beta_1(SE \times Post)_{it} + \beta_2(High\text{-}ActiveShare \times Post)_{it} + \\ \beta_3(SE \times Post \times High\text{-}ActiveShare)_{it} + \beta_4 X_{it} + \alpha_i + \alpha_t + \epsilon_{it} \end{aligned} \tag{2}$$

where, $Y_{it}$ denotes the costs, including commission, management fee, and TER, a fund's trading activity, measured as turnover, and performance, measured as alpha, Sharpe ratio, fee revenue, and abnormal return of fund $i$ in year $t$. $SE \times Post_{it}$ is the isolated effect of the unbundling of commissions, where $Post_t$ is one in 2016-2018 and zero in 2013-2015, and $SE_i$ is one for the treated group (SE funds) and zero for the control group (US funds). $High\text{-}ActiveShare_i$ is a dummy variable that takes value 1 when the Active Share exceeded 60 in the end of 2016 (see Cremers et al., 2016, for a detailed motivation of this cutoff).[24] $SE \times Post \times High\text{-}ActiveShare_{it}$ is the isolated effect of the unbundling of commissions in Sweden on high-ActiveShare funds. $X_{it}$ denotes a control variable that is the natural logarithm of the total net assets (TNA). Finally, we include fund and time fixed effects and estimate robust standard errors clustered at the fund-level.

Table 7 shows the detailed results of the effects of the unbundling of commissions. We find a marginally significant triple-interaction effect (the p-value is $p = 0.109$) in the case of commissions. Given that none of the other interaction terms are significant, this implies that high-ActiveShare funds, on average, increased their reported commissions by 5.8 bps after the event while commissions of low-ActiveShare funds did not change. The positive effect on commissions is consistent with the view that according to the soft dollar arrangements high-ActiveShare funds were underpaying for research (or, were paying for it through other intransparent means).

*Insert Table 7 about here*

In the case of management fees, the situation is different. The coefficient of the triple-interaction illustrates that the effect of unbundling on high-ActiveShare funds is positive and statistically significant. For Swedish high-ActiveShare funds, the management fees increased by 13.4 bps compared to the control groups. This captures the isolated or relative effect of the unbundling of commissions in Sweden on high-ActiveShare

[24]The results are qualitatively similar using Active Share as a continuous variable instead. The proportions of high-ActiveShare funds in Sweden (SE) and the US are 38% and 98%, respectively. Given that our initial sample only contains actively managed funds, the cutoff yields similar—albeit higher for the US—proportions as in Cremers et al. (2016) where about 39% (80%) of funds were classified as high-ActiveShare funds in 2010 in SE (US) (calculated as 35/(55+35)=38 and 59/(15+59)=80 based on Fig. 1, p. 544, where True Active is the same as high-ActiveShare and we exclude Explicit Indexing funds).

funds, which is the main object of interest of our study. A Swedish investor in high-ActiveShare funds, however, cares mostly about the cumulative effect of the unbundling on management fees, after accounting for all effects associated with the *Post* period. Table 7 reports this cumulative effect, which in our setup is simply calculated as the sum of the coefficients on the three interaction terms that include the *Post*-dummy. In the case of management fees, all these coefficient estimates are individually statistically significant. The cumulative effect turns out to be slightly negative, indicating a reduction of -2.6 bps, but not statistically significant. Thus, overall high-ActiveShare funds did not change their management fees after the unbundling of commissions. Interestingly, low-ActiveShare funds exhibited a large decrease of -12.2 bps in the post-period.

The situation is very similar, but slightly amplified, for TERs. The TERs of high-ActiveShare funds in Sweden increased in the post-period, as indicated by the significantly and economically sizable coefficient of the triple-interaction. The cumulative effect for high-ActiveShare funds in Sweden, however, is a statistically insignficant reduction of 5.0 bps.

Overall, the relative effect of unbundling on commissions, management fees and TERs is positive implying increases in fund costs for high-ActiveShare funds in response to improved cost transparency. These increases, however, need to be interpreted relative to Swedish low-ActiveShare funds and US high-ActiveFunds. In absolute or cumulative terms, the picture looks somewhat different, as these effects are all indistinguishable from zero for high-ActiveShare funds. This also implies that Swedish low-ActiveShare funds experienced substantial drops, especially for management fees and TERs, in the post-period. Similarly, it implies that US high-ActiveShare funds exhibited sizable drops in the post-period. Thus, overall Swedish investors in high-ActiveShare funds might not have suffered from higher costs in absolute terms but certainly did so in relative terms after the unbundling of commissions.

To better understand the differences between Swedish high- and low-ActiveShare funds, we compare unbundled research commissions across these samples in Sweden. One could imagine that, before the unbundling and within the same fund management company, low-ActiveShare funds partly covered research costs of high-ActiveShare funds. Once research costs had to transparently be assigned to funds and these cross-subsidies were removed, TERs for high-ActiveFunds should have gone up and those for low-ActiveShare funds should have gone down, consistent with the empirical evidence just presented. When we look at the explicit information on research costs available after the unbundling, however, we find no evidence that research costs differed for high-ActiveShare funds ($M = 0.045, SD = 0.045$) compared to low-ActiveShare funds ($M = 0.046, SD = 0.037$), $t(128) = 0.062, p = .95$.[25] Thus, we are skeptical that the above mechanism can explain the fee dynamics for high- and low-ActiveShare funds.

Table 7 also reports results for various performance measures. In the case of traditional fund performance measures—the Sharpe ratio, abnormal returns and alphas (all net of fees)—coefficients of the triple interaction term are all statistically insignificant. Thus, in relative terms, Swedish high-ActiveShare funds did not perform differently from control funds after the unbundling. Overall, however, the Swedish fund sample, both high and low-ActiveShare funds, experienced negative performance in the post-period.

[25] We also find no difference between execution costs for high-Active Share funds ($M = 0.081, SD = 0.069$) compared to low-ActiveShare funds ($M = 0.081, SD = 0.068$), $t(130) = -0.025, p = .98$.

The final dependent variable that we analyze in Table 7 is fee revenue. Here the results are different, as we find that fee revenues increased significantly for Swedish high-ActiveShare funds after the unbundling of commissions. This increase occurs in relative terms (i.e., the coefficient of the triple interaction term of 1.768) as well as in absolute terms (i.e., the cumulative effect of 1.516). Interestingly, low-ActiveShare funds did not experience the same increase in profitability. Given the earlier result that high-ActiveShare funds had no significant change in TERs, this implies that these funds have experienced, on average, additional inflows in the post-period. Overall, these results are consistent with the idea that in the end high-ActiveShare funds, instead of investors, benefited from the initiative to unbundle commissions.

*4.4. The Value of Unbundled Cost Transparency*

The analysis so far has documented that investors did not benefit from the unbundling of commissions in terms of better fund performance, even though fund fees dropped in response to the change to some extent. An additional channel through which the unbundling could have affected fund investors is through the increase in transparency that might still provide useful information to guide investors in their fund selection. We thus turn to the supplemental sample of Swedish funds, zooming in on the research payments, execution payments and execution costs per trade. These are available in the period 2016-2018 but only for the Swedish funds. For the descriptive statistics, we first divide all funds into quintiles based on their research ratios (Panel A), execution ratios (Panel B), and execution costs per trade (Panel C). Table 8 shows the averages (standard deviations) of four different performance measures per quintile. We also run t-tests to evaluate if the quintiles with the highest unbundled commissions perform worse than those with lowest, also reported in Table 8.

*Insert Table 8 about here*

For all three dependent variables, in Panels A, B and C, we see that the cross-fund variation in research cost ratios, execution cost ratios and execution costs per trade, respectively, is large. There is no clear association with fund performance, as we mainly observe erratic patterns. The fee revenue is higher when the research ratio, execution ratio, or execution costs per trade are lower.

To formally test if there are linear relationships between unbundled commissions and fund performance conditional on several control variables, we employ the following regression,

$$Y_{it} = \alpha_0 + \beta_1 Commissions_i + \beta_2 X_{it} + \epsilon_{it} \tag{3}$$

where $Y_{it}$ is the fund performance, measured as alpha, Sharpe ratio, fee revenue (interpreted as a performance measure from the fund management's perspective), and abnormal return, $Commissions_{it}$ is the $i$th fund's commissions measured as (a) research ratio; (b) execution ratio; and (c) execution cost per trade for period $t$[26]; $X_{it}$ includes the following control variables: $\ln(\text{assets})_{it}$ is the natural logarithm of the year-end

[26]Please note that we study contemporaneous associations in this empirical framework in order to maximize the number of observations given the very short time-series dimension of the available data. In Table C5 in the E-companion, we show that results are similar using lagged variables instead.

fund TNA for fund $i$ in year $t$; $\ln(\text{age})_{it}$ is the natural logarithm of the years between t = 2019 and since fund $i$ started; $\text{turnover}_{it}$ is the reported total of bought and sold assets divided by year-end TNA for fund $i$ in year $t$; $\ln(\text{family assets})_{it}$ is the natural logarithm of the year-end total assets of the fund family for fund $i$ in year $t$; $\text{bank}_{i\delta}$ is a dummy variable equal to one if the fund family for fund $i$ is a bank or zero otherwise; $\text{emerging markets}_{i\delta}$ is a dummy variable equal to one if fund $i$ invests in emerging markets and zero otherwise; $\text{abnormal return}_{i(t-1)}$ is the monthly average benchmark adjusted returns for fund $i$ in year $t-1$; $\text{volatility}_{i(t-1)}$ is the volatility (standard deviation) of the benchmark adjusted returns for fund $i$ in year $t-1$; and $\text{year}_{\delta}$ indicates what year data we are using. We estimate robust standard errors clustered at the fund-level.

*Insert Table 9 about here*

We show the results of the OLS regressions in Table 9. Panel A shows that the research costs are negatively and significantly related to the abnormal returns and the Sharpe ratios but not to alphas and fee revenues. Panel B shows that the execution costs[27] are negatively and significantly related only to the abnormal returns but do not help explain variation in alphas and Sharpe ratios. However, funds with higher execution costs seem to be more profitable as the fee revenue is higher after adding controls.

Finally, in Panel C, controlling for research costs and execution costs contemporaneously confirms the earlier results. While research costs are negatively related to Sharpe ratios and abnormal returns, execution costs are positively associated with fee revenue.

Overall, these results have to be interpreted cautiously because it is well-known that performance measures are noisy and the time-series dimension that we rely on is short, covering only 3 years of data. One particular feature of the data that adds to the noise is that, in 2018, the year of the MiFID II adoption in the rest of the EU, Swedish funds suddenly reported much lower research costs. Figure 2 illustrates this pattern and shows that research costs, in both the main sample and the supplemental sample, almost disappeared in 2018 while being sizable in the years before. While one explanation of this pattern could have been that funds basically stopped using sell-side research, the more likely explanation is that fund management companies decided to pool and internalize the costs for sell-side research (i.e., put it to their P&L statements) rather than keeping those costs within the funds.[28] The MiFID II regulation explicitly allows for such a procedure.

Given the focus of our study on the fund investor's perspective, we conclude that neither research costs nor execution costs seem to be a reliable signal of high-quality funds. While execution costs are surprisingly unrelated to fund performance, there is some weak evidence that research costs are negatively related to

[27]The correlation between execution per size and per trade is 0.727; all results are similar when we look at the execution costs per size compared to the execution costs per trade—we thus report only the execution costs per trade. The correlation between research and execution cost per trade is 0.079, thus we model them together in Panel C.

[28]In fact, already in 2017, two of the largest Swedish banks (Handelsbanken and Swedbank Robur) stated in their annual report that they would reallocate research payments to their P&L statements in 2018. In separate results, available from the authors upon request, we study the choice of funds to internalize research costs and find that internalizing funds had lower management fees and TER, were larger funds, and were part of larger fund management companies that were also more profitable.

some performance measures. Thus, the value of unbundled cost transparency for fund investors appears to be low.

## 5. Concluding Remarks

Using early evidence from Sweden, we show that unbundling of commissions has not led to lower commissions paid by the average mutual fund. While we find some indication that fund managers might have tried to keep TER (that included research costs past unbundling) unchanged by lowering fund management fees, we find no evidence of substantial effects of the unbundling of commissions on the costs investors had to pay when investing through mutual funds. When splitting funds into high-ActiveShare and low-ActiveShare funds, we find some heterogeneity in results. Most importantly, high-ActiveShare funds were paying higher commissions when going from soft to hard dollars. Similarly, they were also increasing management fees and TERs. This implies that investors of high-ActiveShare funds ended up paying substantially larger investment costs in the post-period. At the same point in time, fund performance (net of fees) did not respond in any noticable way to the unbundling.

We also study whether investors have potentially experienced information gains from the increased transparency on research and execution costs. In that respect, however, it is important to emphasize that, in 2018, a majority of the fund families in our sample decided to re-allocate costs for research services to their P&L statement after adopting the official MiFID II regulation. Thus, most funds decided to leave the Swedish model at that point in time and to reduce, yet again, cost transparency for their investors. However, when studying the relation between execution costs as well as research costs, as long as we observe them, on fund performance, we find only weak and very mixed evidence. Overall, the information content of these commissions on fund quality, asset management skills and, ultimately, fund performance appear to be weak.

As discussed before, our study is the first one to assess the impact of the unbundling of commissions on fund investors. While commissions are small in absolute terms, they are still sizeable in aggregation. Furthermore, large parts of the public debate on MiFID II are concentrating on that particular aspect of the regulation and on targeting the conflicts of interest and inefficiencies in the old, bundled setup of premium brokerage services. That entire discussion and argumentation hinges on the assumption that investors were hurt in the old system and are better off in the new, unbundled framework. Our empirical analysis, however, challenges precisely this aspect of the debate. Our empirical findings indicate that low-ActiveShare funds became cheaper but otherwise do not support that investors benefit from MiFID II unbundling.

## 6. Repositories of Code and Data

Code and data—when allowed—are available through the Open Science Framework (Fröberg and Halling, 2021): The scripts for accessing the US data are available through Github, the Swedish datasets are available through Mendeley Data, and the Stata do-files are available through the OSF Storage (in Germany/Frankfurt).

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## 7. Tables and Figures

**Table 1.** Previous Research on MiFID II

| Authors | Design | Study objects | DV(s) | Results |
|---|---|---|---|---|
| Anselmi and Petrella (2021) | Diff-in-diff: EU vs. non-EU (Japan & US); 2015-2019 (firm-month, firm controls) | Sell-side; Firms | Sell-side coverage; Stock liquidity (bid-ask spread); Price efficiency (delay) | Lower sell-side coverage (but not especially for small cap); lower stock liquidity overall (but not when separating based on market cap); no/weak evidence of an effect on price efficiency |
| Bankamp et al. (2021) | Diff-in-diff: EU vs. US; 2015-2019 (firm-year, firm & country controls) | Sell-side | Sell-side coverage; Sell-side optimism (sentiment polarity); Sell-side novelty | Lower sell-side coverage; lower sell-side optimism; higher sell-side novelty |
| Fang et al. (2020) | Diff-in-diff (matched sample): EU vs. North America; 2015-2018 (firm-year, country controls) | Sell-side; Buy-side; Firms | Sell-side research quantity (coverage, especially for small/privately owned/funded/less traded firms); Sell-side research quality (forecasts, recommendations); Buy-side research quantity (nr of in-house analysts, participations in conf. calls); Stock-market liquidity | Lower sell-side quantity; higher sell-side quality; higher buy-side quantity; lower liquidity |
| Fecht et al. (2021) | Diff (post): Germany; 2014-2019 (bank-stock-month, controls for all) | Sell-side; Firm; Private investors | Research quality (forecast errors, recommendation changes); Private investors' purchases of recommended stocks of affiliated analysts to their bank | Higher research quality; Private investors are more likely to buy a stock that their bank sells while its analyst recommends to buy the stock and these stocks are more likely to underperform |
| Fu et al. (2021) | Diff-in-diff: UK-LSE vs. UK-AIM (SMEs); 2015-2020 (firm-month, firm & country controls | Sell-side; Firms | Sell-side coverage; Sell-side quality (forecasts); Stock liquidity (e.g., relative spread) | Lower research coverage for LSE SMEs; Higher research coverage for AIM SMEs; Lower stock liquidity for LSE SMEs; Higher forecast quality for AIM SMEs; Higher stock liquidity for AIM SMEs |
| Guo and Mota (2021) | Diff-in-diff: EU vs. US; 2014-2018 (firm-year) | Sell-side; Firms | Research quantity (coverage, especially for small firms); Research quality (forecasts) | Lower quantity; higher quality |
| Jackson and Zhang (2020) | No stat: Pre-post: UK and EU, daily (2014-2019) | Firms | Firm information environment (bid-ask spread; synchronicity/R2) | No significant change |
| Kim et al. (2021) | Diff-in-diff: EU vs. US; 2016-2019 (firm-year, firm controls) | Firms | Firms' voluntary disclosure | Higher propensity to issue earnings guidance; Higher number of earnings guidance (i.e., voluntary disclosure) |
| Lang et al. (2019) | Diff-in-diff: EU vs. US; 2015-2018 (firm-year) | Sell-side; Firms | Research quantity (coverage); Research quality (forecasts, recommendations); Firm information environment (bid-ask spread, PEAD) | Lower quantity; Higher quality; Worse information environment |
| Liu and Yezegel (2020) | Diff-in-diff: EEA vs. US; Nov, 2015-Oct, 2019 (broker-firm-day) | Sell-side | Separation of trading and research (did recommendation revisions lead to trading through other brokers); Sell-side research quantity (coverage); Sell-side research quality (forecasts, recommendations) | No change in analysts revisions, but lower trading volume (especially among "heavy" traders); No change in pre- vs. post earnings returns of recommendation revisions |
| Lourie et al. (2020) | Diff-in-diff: EU vs. US, 2017-2018 (analyst–stock–year, sell-side controls) | Sell-side; Firms | Analyst research–trading volume (trading volume linked to sell-side coverage, optimism, and accuracy) | Lower coverage and optimism; Sell-side coverage and optimism are less likely to drive trading volume; No effect on accuracy; Lower research-trading link |
| Pope et al. (2019) | Diff-in-diff: Analysts in Sweden vs. other EU countries following Swedish firms; 2013-2016 (analyst-year) | Sell-side; Firms | Sell-side research quantity (coverage, especially for small firms); Sell-side research quality (forecasts); Market consequences (market reaction to recommendation revisions) | Lower quantity (especially small firms/less institutional owners); Higher quality; More market reactions |

**Table 2.** Definitions

| | |
|---|---|
| Abnormal Return | The cumulative log monthly fund net returns in excess of the benchmark net returns in the last 12 months, in %. |
| Active Share | The percentage of fund holdings that is different from the benchmark holdings. |
| Alpha | The annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. |
| Commission (Ratio) | Ex post research and execution costs (in % of year-end TNA). If bundled, Research is compensated through brokerage commissions for Execution. If unbundled, the sum of Research and Execution. In the US, before (in) 2018, Commissions is item C 21 (16 b) in the N-SAR (N-CEN) filing: Aggregate brokerage commissions paid by Registrant (Fund) during [current] reporting period (divided by year-end TNA). |
| EBIT | Earnings Before Interest and Taxes, as reported in the year-end report by the fund management company. |
| Execution (Ratio) | Explicit ex post costs (incl. clearing fees) associated with the purchases and sales of securities in the fund portfolio during the year (in % of year-end TNA). |
| Execution Costs per Trade | Ex post cost % of traded securities twelve months back in time (e.g., if a fund bought and sold securities worth of 100 MSEK and execution costs were 100 kSEK, then it is 0.1%). |
| Fee Revenue | The annualized average of the previous month TNA in millions in local currency times the year-end TER divided by 12 over the last 12 months. |
| Fund Mgmt. Assets | Total assets, as reported in the year-end report by the fund management company. |
| High-ActiveShare | Dummy that takes value 1 if the percentage of fund holdings that is different from the benchmark holdings exceeds 60%, and 0 otherwise. |
| Management Fee | Ex ante management fee that fund investors are charged. As reported in the year-end report in Sweden. It is measured in % of TNA, but investors are charged 1/365 of the management fee each day during the year. In the US (the CRSP database), it is defined as "Management fee ($)/ Average Net Assets ($): The fee is calculated using ratios based on the line items reported in the Statement of Operations. The management fee can be offset by fee waivers and/or reimbursements which will make this value differ from the contractual fees found in the prospectus. Reimbursements can lead to negative Management Fees." |
| Ongoing Charges | Ex ante total ongoing charges of the fund, based on previous years' actual costs, and reported in the year-end report. They include the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution (including costs related to marketing). When using the accounting method (the Swedish model), *Research* is also included. |
| Research (Ratio) | Ex post costs during the year (in % of year-end TNA) for investment research and advisory from an external part. |
| Sharpe Ratio | The annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. |
| TNA | The total net assets (fund size) are the total assets minus total liabilities as of the end-period. Reported in millions of the local currency. |
| TER | Ongoing Charges (see above) including performance fees. |
| Turnover | The minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. |

**Table 3.** Summary Statistics of Fund Costs and Trading Activity

| *Panel A: SE sample* | | | | | |
|---|---|---|---|---|---|
| | SE-Pre | | SE-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Commission Ratio | 0.127 | 186 | 0.108 | 178 | 0.018 |
| | (0.120) | | (0.081) | | (1.680) |
| Mgmt. Fee | 1.303 | 183 | 1.232 | 174 | 0.071 |
| | (0.408) | | (0.423) | | (1.611) |
| TER | 1.323 | 186 | 1.255 | 179 | 0.069 |
| | (0.436) | | (0.440) | | (1.498) |
| Turnover | 0.641 | 165 | 0.605 | 170 | 0.037 |
| | (0.512) | | (0.501) | | (0.663) |
| *Panel B: US sample* | | | | | |
| | US-Pre | | US-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Commission Ratio | 0.063 | 307 | 0.078 | 222 | -0.015 |
| | (0.184) | | (0.199) | | (-0.880) |
| Mgmt. Fee | 0.744 | 305 | 0.771 | 219 | -0.027 |
| | (0.354) | | (0.352) | | (-0.858) |
| TER | 1.072 | 305 | 1.132 | 220 | -0.060 |
| | (0.581) | | (0.668) | | (-1.099) |
| Turnover | 0.553 | 304 | 0.604 | 220 | -0.050 |
| | (0.790) | | (0.844) | | (-0.700) |
| *Panel C: Supplemental sample* | | | | | |
| | SE-L-Post | | SE-F-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Research Ratio | 0.039 | 231 | 0.026 | 343 | 0.013 |
| | (0.054) | | (0.049) | | (3.034) |
| Execution Ratio | 0.077 | 233 | 0.202 | 348 | -0.124 |
| | (0.073) | | (0.415) | | (-4.528) |
| Execution Costs per Trade | 0.053 | 201 | 0.113 | 330 | -0.060 |
| | (0.039) | | (0.221) | | (-3.804) |
| Mgmt. Fee | 1.204 | 227 | 1.421 | 344 | -0.217 |
| | (0.455) | | (0.641) | | (-4.422) |
| TER | 1.223 | 233 | 1.503 | 349 | -0.279 |
| | (0.486) | | (0.687) | | (-5.373) |
| Turnover | 0.610 | 220 | 0.713 | 302 | -0.104 |
| | (0.550) | | (0.804) | | (-1.653) |

This table presents summary statistics of fund costs and trading activity, by sample. The pre-period is defined as 2013, 2014 and 2015, and the post-period is defined as 2016, 2017, and 2018. Commissions are ex post costs during the year in % of year-end TNA, reported in the year-end report. In the post-period for Swedish funds, these are the sum of: (a) Research, ex post costs during the year in % of year-end TNA for investment research and advisory from an external part; and (b) Execution, explicit ex post costs (incl. clearing fees) associated with the purchases and sales of securities in the fund portfolio during the year in % of year-end TNA. In the US, before (in) 2018, commission is item C 21 (16 b) in the N-SAR (N-CEN) filing: Aggregate brokerage commissions paid by Registrant (Fund) during [current] reporting period. Mgmt. fee is the ex ante management fee that fund investors are charged, as reported in the year-end report in SE. It is measured in % of TNA, but investors are charged 1/365 of the management fee each day during the year. In the US, it is the $mgmt_fee$ in the CRSP database, using the average TNA. TER is the ex ante total ongoing charges of the fund, based on previous years' actual costs, and reported in the year-end report. TER includes the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution (including costs related to marketing). In the US, it includes performance fees also (in Sweden, a negligible proportion of funds use performance based fees). TER does not include bundled commissions, but in Sweden it includes *Research* in the post-period. Turnover is the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. Execution cost per trade is the total execution costs in % of the sum of aggregated sales and purchases of securities 12 months back in time, as reported in the year-end report. Note that TER and Mgmt. Fee are in % of average TNA whereas commission, research and execution ratios are in % of year-end TNA.

**Table 4.** Summary Statistics of Fund Performance

| *Panel A: SE sample* | | | | | |
|---|---|---|---|---|---|
| | SE-Pre | | SE-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Alpha | 1.138 | 191 | 0.297 | 193 | 0.842 |
| | (1.874) | | (1.156) | | (5.302) |
| Sharpe Ratio | 1.607 | 191 | -0.445 | 193 | 2.052 |
| | (0.744) | | (1.123) | | (21.084) |
| Fee Revenue | 58.955 | 179 | 79.131 | 174 | -20.176 |
| | (73.526) | | (99.335) | | (-2.173) |
| Abnormal Return | 2.914 | 191 | 1.285 | 193 | 1.629 |
| | (6.676) | | (3.949) | | (2.914) |
| *Panel B: US sample* | | | | | |
| | US-Pre | | US-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Alpha | -0.275 | 307 | -0.163 | 222 | -0.112 |
| | (2.436) | | (2.468) | | (-0.519) |
| Sharpe Ratio | 1.201 | 307 | -0.195 | 222 | 1.396 |
| | (1.385) | | (1.876) | | (9.847) |
| Fee Revenue | 30.783 | 300 | 22.240 | 216 | 8.543 |
| | (56.956) | | (44.019) | | (1.843) |
| Abnormal Return | -1.662 | 307 | -2.305 | 222 | 0.642 |
| | (8.011) | | (8.588) | | (0.883) |
| *Panel C: Supplemental sample* | | | | | |
| | SE-L-Post | | SE-F-Post | | Diff |
| | Mean/(SD) | N | Mean/(SD) | N | Diff/(t-stat) |
| Alpha | 0.303 | 258 | -0.223 | 394 | 0.526 |
| | (1.234) | | (3.350) | | (2.418) |
| Sharpe Ratio | -0.533 | 258 | -0.226 | 395 | -0.308 |
| | (1.183) | | (1.541) | | (-2.724) |
| Fee Revenue | 5.902 | 203 | 5.776 | 295 | 0.127 |
| | (8.010) | | (8.241) | | (0.171) |
| Abnormal Return | 1.169 | 258 | -0.475 | 395 | 1.644 |
| | (4.093) | | (9.066) | | (2.736) |

This table presents summary statistics of fund performance, by sample. The pre-period is defined as 2013, 2014 and 2015, and the post-period is defined as 2016, 2017, and 2018. Alpha is the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. Sharpe Ratio is the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. Fee Revenue is the annualized average of the previous month fund size in millions in local currency times the year-end TER divided by 12 over the last 12 months. Finally, the Abnormal Return is the cumulative log monthly fund net returns in excess of the benchmark net returns in the last 12 months, in %. Note that the $SE-L$ is larger than the $SE-Post$ sample, because we do not require observations in the pre-period (but almost two thirds of the observations are the same).

**Table 5.** Diff-in-Diff Analysis Using Fixed Effects Panel Regression

| *Panel A: Fund costs* | | | | |
|---|---|---|---|---|
| | Commission | Mgmt. fee | TER | Turnover |
| SE x Post | 0.019 | -0.046 | 0.002 | -0.048 |
| | (1.550) | (-1.474) | (0.050) | (-0.799) |
| Fund size | -0.085*** | 0.030$^{+}$ | -0.062** | -0.032 |
| | (-4.798) | (1.922) | (-2.665) | (-0.268) |
| Obs | 1130 | 1111 | 1125 | 1091 |
| Funds/CIKs | 274 | 271 | 273 | 273 |
| R2-within | 0.097 | 0.057 | 0.059 | 0.009 |
| R2-between | 0.077 | 0.192 | 0.287 | 0.024 |
| *Panel B: Fund performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| SE x Post | -1.639*** | -0.887*** | 14.766** | -3.400*** |
| | (-5.169) | (-7.570) | (3.271) | (-3.380) |
| Fund size | 0.711** | 0.318** | 13.744*** | 2.459** |
| | (3.016) | (2.699) | (5.507) | (3.093) |
| Obs | 1121 | 1121 | 1085 | 1121 |
| Funds/CIKs | 266 | 266 | 260 | 266 |
| R2-within | 0.088 | 0.703 | 0.220 | 0.043 |
| R2-between | 0.003 | 0.278 | 0.408 | 0.012 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.1$

This table shows the results of the panel regressions specified in Eq. 1. The dependent variable of Panel A in Column (**1**) is Commissions, the ex post costs during the year in % of year-end TNA. The dependent variable of Panel A in Column (**2**) is Mgmt. fee, the ex ante management fee that fund investors are charged, as reported in the year-end report in SE and in the CRSP database in US. The dependent variable of Panel A in Column (**3**) is TER, the total expense ratio measured as the ex ante total ongoing charges (i.e., the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution including costs related to marketing) of the fund in SE as reported in the year-end report. In the US, it is the TER in the CRSP database (this includes also any performance fees; these are negligible in the SE context). TER does not include bundled commissions, but in Sweden it includes costs for investment research and advisory from an external part in the post-period. The dependent variable of Panel A in Column (**4**) is Turnover, the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. The dependent variable of Panel B in Column (**1**) is Alpha, the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. The dependent variable of Panel B in Column (**2**) is the Sharpe ratio, the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. The dependent variable of Panel B in Column (**3**) is Fee Revenue, the annualized average of the previous month TNA in millions in local currency times the year-end TER divided by 12 over the last 12 months. The dependent variable of Panel B in Column (**4**) is Abnormal Return, the cumulative log monthly fund net returns in excess of the benchmark net returns, in the last 12 months, in %. Post is a dummy variable that takes on values 1 in the post-period (2016-2018) and 0 in pre-period (2013-2015). SE is a dummy variable that takes on values 1 for the treated (Swedish) sample, and 0 for the control (US) sample. The diff-in-diff effect is the interaction term (SE x Post). Fund size is the natural logarithm of the year-end total net assets of the fund. The *t-statistics* are reported in parenthesis, standard errors are robust and clustered at the fund-level. The panel regressions include fund and year fixed effects. Pooled and random effects models are reported in the E-companion.

**Table 6.** Dynamic Coefficient Point Estimates

| *Panel A: Fund costs* | | | | |
|---|---|---|---|---|
| | Commission | Mgmt. fee | TER | Turnover |
| SE x Y14 | -0.022 | 0.002 | 0.025 | -0.027 |
| | (-1.254) | (0.084) | (0.939) | (-0.473) |
| SE x Y15 | 0.015 | -0.028 | 0.018 | -0.093 |
| | (0.985) | (-1.018) | (0.603) | (-1.296) |
| SE x Y16 | 0.019 | -0.055 | 0.004 | -0.078 |
| | (1.340) | (-1.331) | (0.089) | (-0.882) |
| SE x Y17 | 0.032* | -0.053 | 0.036 | -0.132 |
| | (2.081) | (-1.222) | (0.751) | (-1.496) |
| SE x Y18 | -0.000 | -0.064 | 0.014 | -0.075 |
| | (-0.008) | (-1.495) | (0.260) | (-0.714) |
| Obs | 1130 | 1111 | 1125 | 1091 |
| Funds/CIKs | 274 | 271 | 273 | 273 |
| R2-within | 0.103 | 0.060 | 0.062 | 0.012 |
| R2-between | 0.077 | 0.214 | 0.297 | 0.016 |
| *Panel B: Fund performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| SE x Y14 | 0.794$^{+}$ | 1.314*** | 6.822** | 3.762*** |
| | (1.901) | (10.028) | (2.605) | (3.383) |
| SE x Y15 | 1.279*** | 1.461*** | 10.916* | 4.679*** |
| | (3.349) | (13.421) | (2.399) | (3.713) |
| SE x Y16 | -0.616 | 0.486*** | 13.116* | -0.275 |
| | (-1.459) | (3.577) | (2.521) | (-0.214) |
| SE x Y17 | -1.390*** | -0.580** | 26.320*** | 1.119 |
| | (-3.433) | (-2.613) | (3.395) | (0.982) |
| SE x Y18 | -0.753$^{+}$ | 0.273 | 28.532*** | -2.637 |
| | (-1.728) | (1.375) | (3.476) | (-1.639) |
| R2-between | 0.012 | 0.289 | 0.422 | 0.035 |
| R2-within | 0.099 | 0.740 | 0.247 | 0.061 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.1$

This table shows the results of the dynamic coefficients regression (see Angrist and Pischke, 2009). We split the $Post_{it}$ dummy into year dummies, using 2013 as the base year. The dependent variable of Panel A in Column (**1**) is Commissions, the ex post costs during the year in % of year-end TNA. The dependent variable of Panel A in Column (**2**) is Mgmt. fee, the ex ante management fee that fund investors are charged, as reported in the year-end report in SE and in the CRSP database in US. The dependent variable of Panel A in Column (**3**) is TER, the total expense ratio measured as the ex ante total ongoing charges (i.e., the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution including costs related to marketing) of the fund in SE as reported in the year-end report. In the US, it is the TER in the CRSP database (this includes also any performance fees; these are negligible in the SE context). TER does not include bundled commissions, but in Sweden it includes costs for investment research and advisory from an external part in the post-period. The dependent variable of Panel A in Column (**4**) is Turnover, the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. The dependent variable of Panel B in Column (**1**) is Alpha, the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, %. The dependent variable of Panel B in Column (**2**) is the Sharpe ratio, the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. The dependent variable of Panel B in Column (**3**) is Fee Revenue, the annualized average of the previous month TNA in millions in local currency times the year-end TER divided by 12 over the last 12 months. The dependent variable of Panel B in Column (**4**) is Abnormal Return, the cumulative log monthly fund net returns in excess of the benchmark net returns, in the last 12 months, in %. SE is a dummy variable that takes on values 1 for the treated (Swedish) sample, and 0 for the control (US) sample. Y14, Y15, Y16, Y17, Y18 are year dummy variables that takes on values 1 if year t is equal to 2014, 2015, 2016, 2017, and 2018. The *t-statistics* are reported in parenthesis, standard errors are robust and clustered at the fund-level. The panel regressions include fund and year fixed effects.

**Table 7.** Triple-difference Analysis Using Fixed Effects Panel Regression

| *Panel A: Fund costs* | | | | |
|---|---|---|---|---|
| | Commission | Mgmt. fee | TER | Turnover |
| SE x Post | -0.024 | -0.122* | -0.181+ | -0.678+ |
| | (-0.741) | (-2.034) | (-1.902) | (-1.731) |
| High-ActiveShare x Post | -0.033 | -0.038** | -0.135+ | -0.736+ |
| | (-1.026) | (-2.744) | (-1.841) | (-1.936) |
| SE x Post x High-ActiveShare | 0.058 | 0.134* | 0.266** | 0.525 |
| | (1.609) | (2.022) | (2.630) | (1.257) |
| Fund size | -0.091*** | 0.036* | -0.066* | -0.011 |
| | (-4.403) | (2.159) | (-2.427) | (-0.079) |
| Cumulative Effect | 0.001 | -0.026 | -0.049 | -0.889 |
| P-value | 0.969 | 0.336 | 0.525 | 0.021 |
| Obs | 981 | 969 | 978 | 948 |
| Funds/CIKs | 237 | 235 | 236 | 236 |
| R2-within | 0.097 | 0.078 | 0.078 | 0.028 |
| R2-between | 0.079 | 0.184 | 0.312 | 0.017 |
| *Panel B: Fund performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| SE x Post | -1.754*** | -0.950** | 0.345 | -2.027* |
| | (-3.943) | (-3.085) | (0.542) | (-2.001) |
| High-ActiveShare x Post | -0.174 | -0.209 | -0.597* | 1.656* |
| | (-0.424) | (-0.690) | (-2.082) | (2.023) |
| SE x Post x High-ActiveShare | -0.249 | -0.203 | 1.768+ | -2.259 |
| | (-0.385) | (-0.621) | (1.737) | (-1.104) |
| Fund size | 0.838** | 0.377** | 1.171*** | 2.503** |
| | (3.056) | (2.780) | (4.239) | (2.798) |
| Cumulative Effect | -2.176 | -1.362 | 1.516 | -2.629 |
| P-value | 0.000 | 0.000 | 0.059 | 0.156 |
| Obs | 987 | 987 | 958 | 987 |
| Funds/CIKs | 237 | 237 | 233 | 237 |
| R2-within | 0.094 | 0.694 | 0.216 | 0.045 |
| R2-between | 0.006 | 0.254 | 0.396 | 0.013 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$, $^{+}p < 0.1$

This table shows the results of the panel regressions specified in Eq. 2. Funds with Active Share > 60, in the end of 2016, are classified as *High-ActiveShare*. The dependent variable of Panel A in Column (**1**) is Commissions, the ex post costs during the year in % of year-end TNA. The dependent variable of Panel A in Column (**2**) is Mgmt. fee, the ex ante management fee that fund investors are charged, as reported in the year-end report in SE and in the CRSP database in US. The dependent variable of Panel A in Column (**3**) is TER, the total expense ratio measured as the ex ante total ongoing charges (i.e., the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution including costs related to marketing) of the fund in SE as reported in the year-end report. In the US, it is the TER in the CRSP database (this includes also any performance fees; these are negligible in the SE context). TER does not include bundled commissions, but in Sweden it includes costs for investment research and advisory from an external part in the post-period. The dependent variable of Panel A in Column (**4**) is Turnover, the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. The dependent variable of Panel B in Column (**1**) is Alpha, the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. The dependent variable of Panel B in Column (**2**) is the Sharpe ratio, the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. The dependent variable of Panel B in Column (**3**) is Fee Revenue, the annualized average of the previous month TNA in millions in local currency times the year-end TER divided by 12 over the last 12 months. The dependent variable of Panel B in Column4 (**4**) is Abnormal Return, the cumulative log monthly fund net returns in excess of the benchmark net returns, in the last 12 months, in %. Post is a dummy variable that takes on values 1 in the post-period (2016-2018) and 0 in pre-period (2013-2015). SE is a dummy variable that takes on values 1 for the treated (Swedish) sample, and 0 for the control (US) sample. Fund size is the natural logarithm of the year-end total net assets of the fund. The Cumulative Effect and the P-value is based on $\beta_1 + \beta_2 + \beta_3$. The *t-statistics* are reported in parenthesis, standard errors are robust and clustered at the fund-level. The panel regressions include fund and year fixed effects.

**Table 8.** Commissions per Quintiles and Fund Performance

| *Panel A: Investment Research Costs (Ratio) and Performance* | | | | | | |
|---|---|---|---|---|---|---|
| | 0-20<br>M/(SD) | 20-40<br>M/(SD) | 40-60<br>M/(SD) | 60-80<br>M/(SD) | 80-100<br>M/(SD) | Diff/t-stat |
| Research Ratio | -0.000 | 0.003 | 0.021 | 0.037 | 0.098 | -0.098 |
| | (0.002) | (0.002) | (0.007) | (0.006) | (0.082) | (-16.234) |
| Alpha | -0.406 | -0.432 | 0.372 | 0.411 | 0.109 | -0.515 |
| | (2.773) | (2.626) | (2.396) | (2.186) | (2.740) | (-1.536) |
| Sharpe Ratio | -1.366 | 0.023 | 0.396 | 0.226 | -0.058 | -1.308 |
| | (1.341) | (1.101) | (1.183) | (1.014) | (1.315) | (-8.100) |
| Fee Revenue | 6.731 | 5.460 | 5.650 | 7.869 | 2.967 | 3.764 |
| | (8.936) | (9.328) | (8.039) | (8.902) | (4.266) | (3.833) |
| Abnormal Return | 1.177 | -1.098 | -0.839 | 1.432 | -0.991 | 2.168 |
| | (7.115) | (7.623) | (8.160) | (6.636) | (6.981) | (2.531) |
| *Panel B: Execution Costs (Ratio) and Performance* | | | | | | |
| | 0-20<br>M/(SD) | 20-40<br>M/(SD) | 40-60<br>M/(SD) | 60-80<br>M/(SD) | 80-100<br>M/(SD) | Diff/t-stat |
| Execution Ratio | 0.019 | 0.039 | 0.067 | 0.119 | 0.515 | -0.496 |
| | (0.007) | (0.006) | (0.011) | (0.024) | (0.613) | (-8.753) |
| Alpha | -0.038 | -0.062 | 0.237 | 0.180 | -0.382 | 0.344 |
| | (2.265) | (2.267) | (2.451) | (2.946) | (3.048) | (0.956) |
| Sharpe Ratio | -0.313 | -0.323 | -0.337 | -0.164 | -0.459 | 0.146 |
| | (1.072) | (1.186) | (1.545) | (1.739) | (1.472) | (0.846) |
| Fee Revenue | 9.305 | 7.265 | 5.585 | 4.781 | 2.021 | 7.284 |
| | (9.953) | (9.839) | (7.909) | (5.954) | (2.536) | (6.673) |
| Abnormal Return | 0.261 | 0.280 | 0.373 | 0.776 | -0.894 | 1.156 |
| | (6.645) | (6.407) | (7.294) | (8.354) | (7.862) | (1.187) |
| *Panel C: Execution cost per Trade and Performance* | | | | | | |
| | 0-20<br>M/(SD) | 20-40<br>M/(SD) | 40-60<br>M/(SD) | 60-80<br>M/(SD) | 80-100<br>M/(SD) | Diff/t-stat |
| Execution Costs per Trade | 0.022 | 0.045 | 0.063 | 0.094 | 0.251 | -0.228 |
| | (0.009) | (0.005) | (0.005) | (0.011) | (0.353) | (-7.689) |
| Alpha | -0.218 | 0.111 | 0.054 | -0.250 | 0.309 | -0.528 |
| | (2.262) | (2.047) | (1.719) | (2.616) | (3.658) | (-1.361) |
| Sharpe Ratio | -0.491 | -0.491 | -0.437 | -0.384 | 0.043 | -0.535 |
| | (1.233) | (1.235) | (1.159) | (1.655) | (1.801) | (-2.702) |
| Fee Revenue | 8.268 | 6.632 | 6.352 | 4.429 | 3.071 | 5.197 |
| | (9.200) | (8.205) | (11.356) | (4.846) | (3.994) | (4.887) |
| Abnormal Return | 0.515 | 0.428 | -0.947 | -0.053 | -0.034 | 0.549 |
| | (6.244) | (6.470) | (6.753) | (7.535) | (9.167) | (0.546) |

This table shows, based on the Swedish supplemental sample, averages (standard deviations) of research ratios (Panel A), execution ratios (Panel B), and execution costs per trade (Panel C) per quintiles (fifths). The last column compares the bottom vs. the top quintiles and reports the difference (the *t-statistics* in parenthesis). Research Ratio is the ex post costs for investment research and advisory from an external part during the year in % of year-end TNA, reported in the year-end report of the fund. Alpha is the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. Sharpe Ratio is the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. Fee Revenue is the annualized average of the previous month fund size in millions in local currency times the year-end TER divided by 12 over the last 12 months. Abnormal Return is the cumulative log monthly fund net returns in excess of the benchmark net returns in the last 12 months, in %. Execution Ratio is the explicit ex post costs (incl. clearing fees) associated with the purchases and sales of securities in the fund portfolio during the year in % of year-end TNA, reported in the year-end report of the fund. Execution Costs per Trade is the total explicit ex post costs associated with the purchases and sales of securities in the fund portfolio divided by the sum of aggregated sales and purchases of securities 12 months back in time, as reported in the year-end fund report. (One fund reversed research costs one year, hence the slight negative average of 0-20.)

**Table 9.** Analysis of Performance on Fund Commissions

| *Panel A: Investment Research Costs (Ratio) and Performance* | | | | |
|---|---|---|---|---|
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Research Ratio | -1.340 | -2.727** | 7.449 | -23.869** |
| | (-0.496) | (-2.829) | (1.505) | (-3.319) |
| Constant | -3.835*** | -1.073** | -19.250*** | -10.473*** |
| | (-3.579) | (-2.821) | (-5.846) | (-3.485) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 496 | 497 | 437 | 497 |
| $R^2$ | 0.202 | 0.764 | 0.496 | 0.197 |
| adj. $R^2$ | 0.187 | 0.759 | 0.486 | 0.182 |
| *Panel B: Execution Costs per Trade and Performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Execution Costs per Trade | 2.306 | 0.261 | 11.243* | -10.434* |
| | (0.820) | (0.435) | (2.440) | (-2.107) |
| Constant | -5.473*** | -1.468*** | -23.426*** | -12.449*** |
| | (-4.537) | (-3.493) | (-6.158) | (-3.669) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 460 | 461 | 409 | 461 |
| $R^2$ | 0.181 | 0.774 | 0.513 | 0.170 |
| adj. $R^2$ | 0.165 | 0.769 | 0.502 | 0.153 |
| *Panel C: Total Commissions and Performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Research Ratio | 0.631 | -2.137* | 0.517 | -18.727** |
| | (0.299) | (-2.479) | (0.102) | (-3.083) |
| Execution Costs per Trade | 2.578 | 0.538 | 11.477* | -8.001 |
| | (0.926) | (0.885) | (2.471) | (-1.769) |
| Constant | -4.772*** | -1.288** | -23.536*** | -9.136* |
| | (-3.771) | (-2.847) | (-5.904) | (-2.503) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 437 | 438 | 404 | 438 |
| $R^2$ | 0.175 | 0.776 | 0.512 | 0.173 |
| adj. $R^2$ | 0.155 | 0.770 | 0.499 | 0.153 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

This table shows the results of the pooled OLS regressions specified in Eq. 3. In Panel A, *Commissions* is the Research Ratio, the ex post costs for investment research and advisory from an external part during the year in % of year-end TNA, reported in the year-end report of the fund. In Panel B, *Commissions* is the Execution Costs per Trade, the total explicit ex post costs associated with the purchases and sales of securities in the fund portfolio divided by the sum of aggregated sales and purchases of securities 12 months back in time, as reported in the year-end fund report. In Panel C, both Research Ratio and Execution Costs per Trade are included as independent variables. The dependent variable of Column (**1**) is Alpha, the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. The dependent variable of Column (**2**) is Sharpe Ratio, the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. The dependent variable of Column (**3**) is Fee Revenue, the annualized average of the previous month fund size in millions in local currency times the year-end TER divided by 12 over the last 12 months. The dependent variable of Column (**4**) is Abnormal Return, the cumulative log monthly fund net returns in excess of the benchmark net returns in the last 12 months, in %. The regressions control for the natural logarithm of the fund size, the natural logarithm of the fund age, the natural logarithm of the fund family size (total assets), a dummy to indicate if it is managed by a bank, a dummy to indicate if it invests in emerging markets, fund abnormal cumulative return (in %) estimated over the previous year, volatility of returns in the previous year, and dummies for years 2017 and 2018 (cf. Jiang and Verardo, 2018). The *t-statistics* are reported in parenthesis, standard errors are robust and clustered at the fund-level.

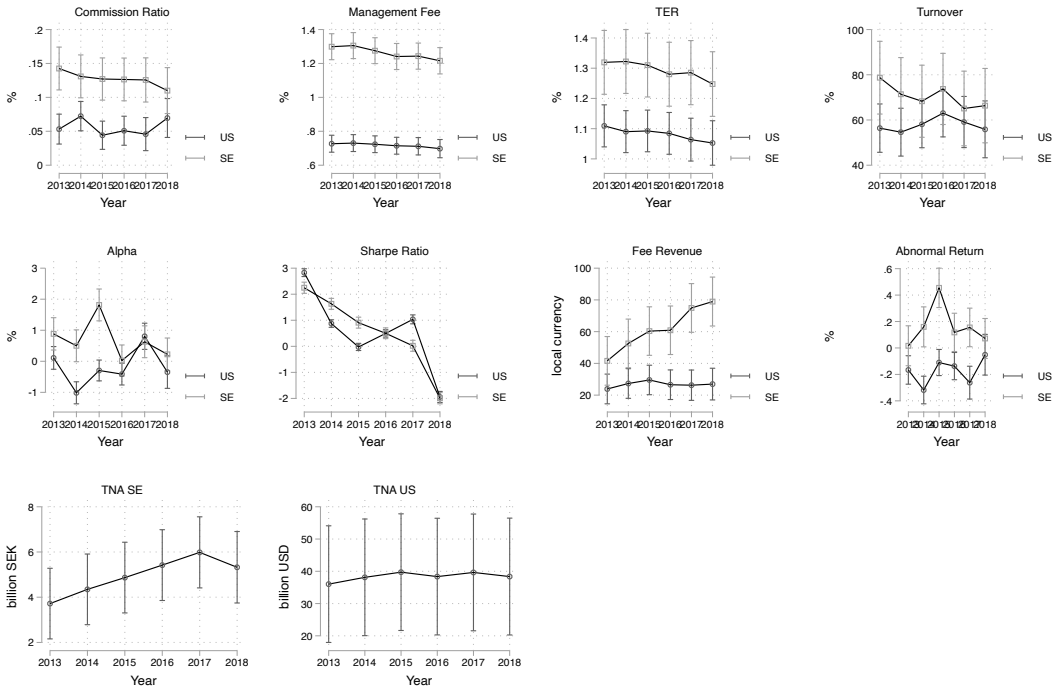


**Figure 1.** Treatment vs. Control Equal-Weighted Yearly Averages

This figure illustrates the equal-weighted yearly averages of the Swedish (SE) and US funds, including a 95% confidence interval (CI). SE is the Treatment group and US is the Control group, the event was in 2016. Commission Ratio is the ex post costs during the year in % of year-end TNA, reported in the year-end report. In the post-period for SE, these are the sum of: (a) Research, ex post costs during the year in % of year-end TNA for investment research and advisory from an external part; and (b) Execution, explicit ex post costs (incl. clearing fees) associated with the purchases and sales of securities in the fund portfolio during the year in % of year-end TNA. In the US, before (in) 2018, commission is item C 21 (16 b) in the N-SAR (N-CEN) filing: Aggregate brokerage commissions paid by Registrant (Fund) during [current] reporting period. Management fee is the ex ante management fee that fund investors are charged, as reported in the year-end report in SE. It is measured in % of TNA, but investors are charged 1/365 of the management fee each day during the year. In the US, it is the $mgmt_fee$ in the CRSP database, using the average TNA. TER is the ex ante total ongoing charges of the fund, based on previous years' actual costs, and reported in the year-end report. TER includes the management fee, registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution (including costs related to marketing). In the US, it includes performance fees also (in Sweden, a negligible proportion of funds use performance based fees). TER does not include bundled commissions, but in Sweden it includes Research in the post-period. Turnover is the minimum of aggregated sales or aggregated purchases of securities, divided by the average 12-month TNA of the fund. Alpha is the annualized intercept in a regression of monthly fund net returns on monthly benchmark net returns in the last 12 months, in %. Sharpe Ratio is the annualized average monthly fund net returns in excess of the risk-free rate of returns, divided by the volatility, in the last 12 months. Fee Revenue is the annualized average of the previous month TNA in millions in local currency times the year-end TER divided by 12 over the last 12 months. The abnormal return is the cumulative log monthly fund net returns in excess of the benchmark net returns in the last 12 months, in %. TNA SE is the total net assets (fund size) of SE funds in billions and in local currency (SEK). TNA US is the fund size of US funds in billions and in local currency (USD).

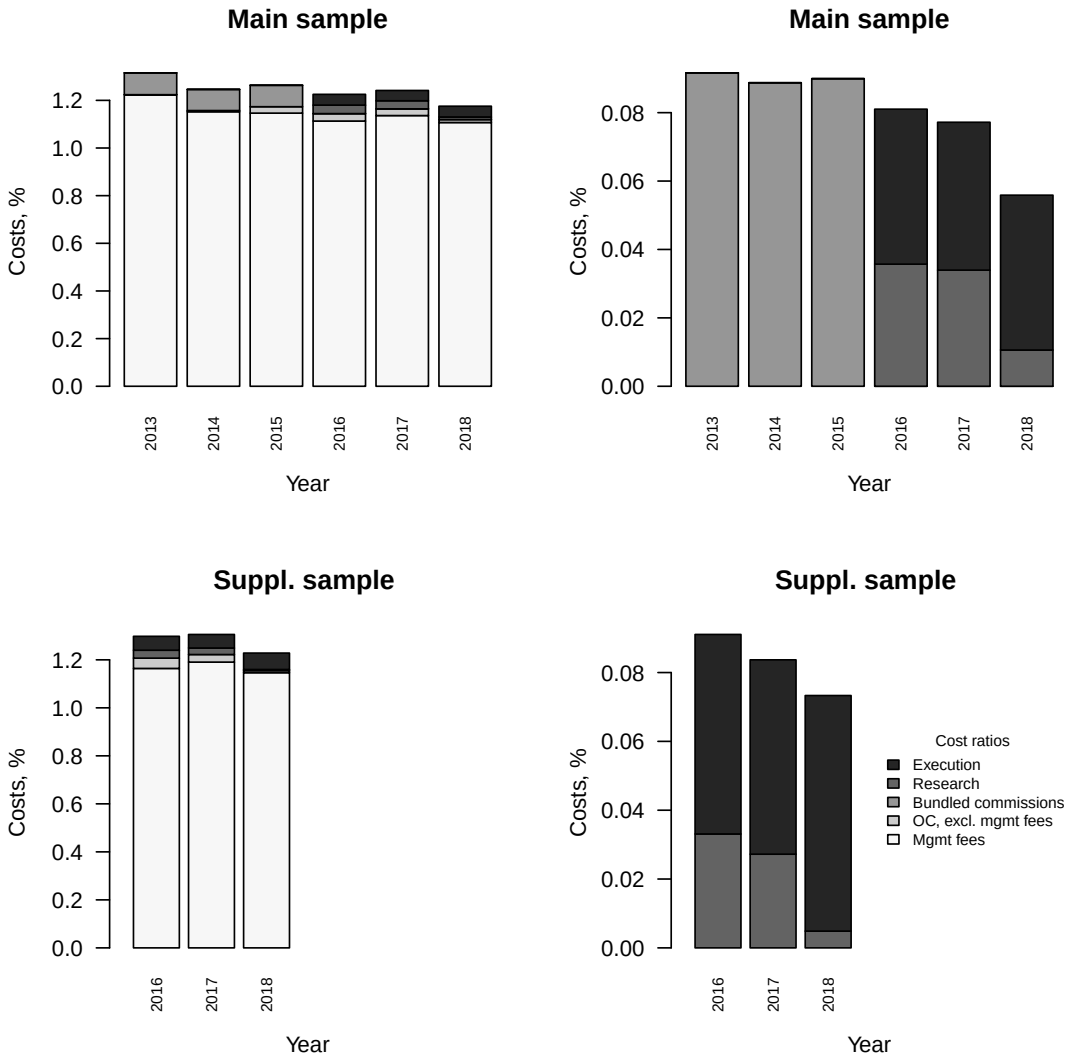


**Figure 2.** Stacked Barplots of Fund Costs by Year Among Swedish Funds

This figure shows four stacked barplots of fund costs in % by year among the Swedish funds. The top row shows the main sample of Swedish funds investing in Swedish equity. The main sample includes 2013-2018, where commissions where bundled the first three years. The bottom row shows the supplemental sample of Swedish funds investing in non-Swedish equity, for 2016-2018 when commmissions where unbundled. The left column shows the mgmt. fees, the OC (excl. mgmt. fees), and the commissions. The right column zooms in on the commissions. Execution is the explicit ex post costs (incl. clearing fees) associated with the purchases and sales of securities in the fund portfolio during the year in % of year-end TNA. Research is the ex post costs during the year in % of year-end TNA for investment research and advisory from an external part. Bundled commissions are the ex post costs during the year in % of year-end TNA, reported in the year-end report (2013-2016). OC, or ongoing charges, excluding management fees are the ex ante total ongoing charges of the fund, based on previous years' actual costs, and reported in the year-end report. OC excl. mgmt fees include registration fees, regulatory fees and similar charges, audit fees, payments to legal and professional advisers, and any costs of distribution (including costs related to marketing). From 2016, it also includes Research. Mgmt. fee is the ex ante management fee that fund investors are charged, as reported in the year-end report in SE. It is measured in % of TNA, but investors are charged 1/365 of the management fee each day during the year. Note that TER and mgmt. fees are in % of average TNA whereas research, execution and bundled commissions are in % of year-end TNA.

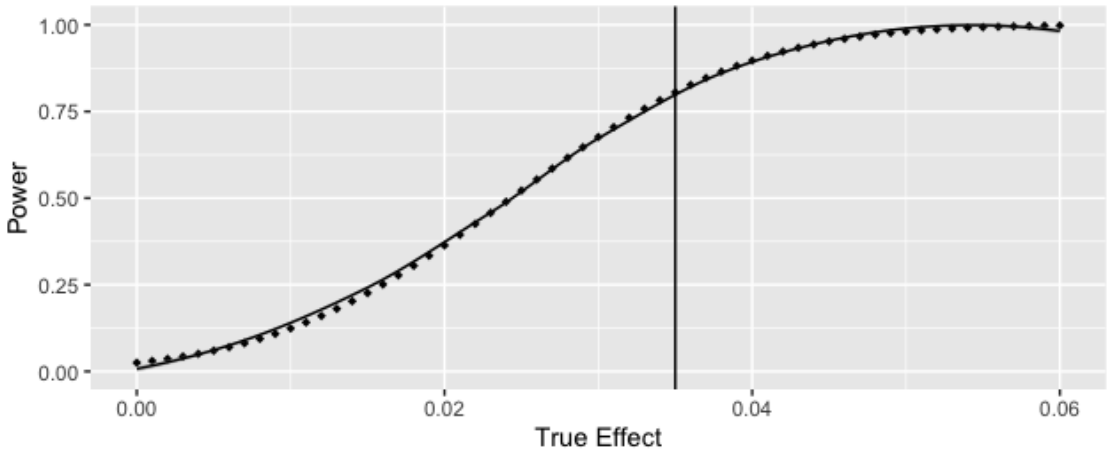


**Figure 3.** Power Calculations

This figure shows the power of our empirical test (see Eq. 1 and Table 5). Different levels of true effects are on the x-axis (in %) and the power of the test is on the y-axis (in %). The vertical line illustrates what true effects are adequately powered (i.e., at a power level of 80% we detect effect sizes at 0.035 or higher). We make the estimations using a standard error of 0.0124 (see Table 5: 0.0193/1.5504 = 0.0124). The critical test value is 0.0244 (standard error × $t$-statistic: 0.0124 × 1.96). The power is calculated as the area under the $t$-distribution from the true effect minus the critical test value divided by the standard error. For example, if the true effect is 3.5 bps, then the $t$-statistic is (0.035-0.0244609)/0.0124669 = 0.84. The power is then 80% (conversely, the probability to make a type II error is 20%). (The other side of the test is negligible.)

## Appendix A. Details of US data

We use the historical (digital) archives of the U.S. Securities and Exchange Commission (SEC) to access the filings of the year-end semi-annual reports for registered investment companies. In 2013-2017, these are filed in the form N-SAR, which was phased out in 2018, and replaced by the form N-CEN. The total number of N-SARs and N-CENs that we download for the period 2007 to 2020 is 12981 and 6037, respectively.

Registered investment companies are required by the Investment Company Act of 1940 to file the semi-annual reports at the Central Index Key (CIK)-level: a unique numerical identifier (never recycled) assigned by the EDGAR system to filers when they sign up to make filings to the SEC. A CIK-level series consists of one or more funds within a family, generally grouped because of a common date of inception such as through merger (Edelen et al., 2012). Luckily, we are only interested in controlling for possible changes in the proportion of commissions to total year-end assets between the pre- and post-periods and can thus still make use of the CIK-level filings. Still, to ensure that the filings are comparable between periods, we create three different samples: (a) the unfiltered sample includes all open-end US funds; (b) the forgiving sample excludes filings that contain at least one fund series that invest in foreign equity or metals in the pre-period; and (c) the clean sample that includes only filings where where all fund classes are only associated with that CIK in all periods, all fund classes reported in all six years, and the filings did not include any fund class that invest in debt, foreign equity, metals and all the included fund series were actively managed equity funds in the pre-period. In the main paper, we present the clean sample and in the E-companion we present the robustness samples. In Table A1, we show that our clean sample includes a lower number of fund series per annual report.

*Insert Table A1 about here*

From the fund annual reports (N-SAR/N-CEN), we collect the year-end reported payments of commissions and fund classifications (debt, foreign, equity, metals, balanced, and index).

The total brokerage commissions pay are reported as follows: (C21) Aggregate brokerage commissions paid by Registrant during current reporting period ($000's omitted) in N-SAR; and (C16B)[29] Aggregate brokerage commissions paid by Fund during the reporting period in N-CEN. The brokerage commissions are reported only in aggregate for all funds in the filing.

From the N-SAR report, we also collect fund classifications that are reported separately for all fund series in a filing: (C62A) Does Registrants/Series invest primarily in debt securities, including convertible debt securities options and futures on debt securities or indices of debt securities? (Y/N); (C66A) Is the Registrant/Series a fund that usually invests in equity securities, options and futures on equity securities, indices of equity securities or securities convertible into equity securities? (Y/N); (C67) Is the Registrant/Series a balanced fund? (Y/N); (C68A) Does the Registrant/Series have more than 50% of its net assets at the end of the current period invested in: The securities of issuers engaged primarily in the production or distribution of precious metals? (Y/N); (C68B) Does the Registrant/Series have more than 50% of its net assets at the end of the current period invested in: The securities of issuers located primarily in countries other than the United States? (Y/N); and (C69) Is the Registrant/Series an index fund? (Y/N). There is not equivalent items in the N-CEN filing and hence we use forward-imputation based on the pre-period.

[29] Available in XML: <aggregateCommission>.

In order to link the annual reports data with data in CRSP and Morningstar, we access all the stock market symbols for all classes of a CIK for all years from the SEC website using https://www.sec.gov/open/datasets-investment_company.html. We import the yearly data-sets in an MySQL database hosted and openly available on an AWS (see the Repositories of Code and Data section for access).

**Table A1.** Number of Series and Share Classes per CIK

| | All<br>M/SD | Forgiving Sample<br>M/SD | Clean Sample<br>M/SD |
|---|---|---|---|
| Nr of series | 8.86 | 5.90 | 1.51 |
| | (15.81) | (12.26) | (1.44) |
| Nr of classes | 30.37 | 20.46 | 4.48 |
| | (63.94) | (53.74) | (6.34) |
| TNA | 95660.76 | 79164.39 | 21346.61 |
| | (707957.11) | (682817.78) | (91310.74) |
| *N* | 7855 | 6017 | 1673 |

## Appendix B. Bayesian Inference

Given that our main result is a non-result, we use Bayesian inference to estimate the probability that the null hypothesis is true. We focus on the null hypothesis of "unbundling having zero effect on commissions." We set the region of practical equivalence (ROPE) to -2 bps to 2 bps. This choice is arbitrary, but should represent an interval that practically is equivalent to no effect given that the average level of commissions was almost 13 bps before the unbundling (see Table 3).

We use all default-values that are used in Stata (*bayes*-command), and we note that the panel regression uses random effects. Default priors are that the coefficients are normally distributed with 0 mean and variance of 10,000. The error variance are inverse-gamma distributed with scale and shape parameters of 0.01. The regression coefficients and the error variance are a priori independent, sampled separately in two different blocks. We use Metropolis-Hastings and Gibbs sampling, with 12,500 MCMC iterations of sample sizes of 10,000 and discarding (burn-in of) the first 2,500.

The estimated posterior effect is -0.037 bps. A 95% credible interval for the effect of unbundling on commissions is given by -2.45 bps to 2.38 bps. We thus note that the credible interval is basically centered around 0. The probability of a null result (the null hypothesis is true), given ROPE of -2 to 2 bps, is 90%. As mentioned in the text, the power to detect a 3.8% effect size is 80%. Using Bayesian inference, we also estimate that the probability is 90% that there was no effect (i.e., magnitude is -2 to 2 bps and thus in practical terms 0).

## Appendix C. E-companion: Additional Tables

**Table C1.** Summary Statistics Including All US Samples

| | SE | | US: All | | US: Forgiving | | US: Clean | |
|---|---|---|---|---|---|---|---|---|
| | Pre M/SD | Post M/SD | Pre M/SD | Post M/SD | Pre M/SD | Post M/SD | Pre M/SD | Post M/SD |
| Commission Ratio | 0.13 | 0.11 | 0.04 | 0.08 | 0.03 | 0.03 | 0.06 | 0.07 |
| | (0.13) | (0.09) | (0.19) | (1.45) | (0.14) | (0.18) | (0.16) | (0.17) |
| Mgmt. Fee | 1.29 | 1.24 | 0.63 | 0.60 | 0.61 | 0.60 | 0.73 | 0.76 |
| | (0.41) | (0.42) | (0.30) | (0.30) | (0.32) | (0.31) | (0.35) | (0.33) |
| TER | 1.31 | 1.26 | 0.97 | 0.91 | 0.95 | 0.93 | 1.07 | 1.12 |
| | (0.43) | (0.43) | (0.47) | (0.48) | (0.50) | (0.50) | (0.53) | (0.59) |
| Turnover | 0.69 | 0.62 | 0.74 | 0.72 | 0.78 | 0.78 | 0.58 | 0.63 |
| | (0.62) | (0.50) | (1.19) | (1.17) | (1.38) | (1.37) | (0.76) | (0.86) |
| Alpha | 1.07 | 0.29 | -0.80 | 0.36 | -0.50 | 0.29 | -0.41 | -0.01 |
| | (1.90) | (1.17) | (2.23) | (2.46) | (2.08) | (2.11) | (2.42) | (2.50) |
| Sharpe Ratio | 1.59 | -0.45 | 0.71 | -1.84 | 0.79 | -1.82 | 1.15 | 0.15 |
| | (0.74) | (1.12) | (1.60) | (4.18) | (1.68) | (3.94) | (1.38) | (1.79) |
| Fee Revenue | 56.58 | 77.27 | 17.25 | 16.74 | 15.77 | 16.60 | 31.01 | 18.03 |
| | (72.80) | (98.56) | (37.68) | (36.82) | (37.50) | (39.34) | (62.01) | (38.27) |
| Abnormal Return | 2.57 | 1.22 | -6.79 | -3.63 | -6.49 | -4.03 | -2.12 | -1.88 |
| | (6.88) | (3.97) | (9.15) | (7.45) | (9.61) | (7.71) | (7.84) | (8.36) |
| $N$ | 222 | 203 | 2868 | 2783 | 1920 | 1795 | 440 | 318 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

**Table C2.** Diff-in-Diff Analysis, All US Sample

*Panel A: Fund costs*

| | Commission | | | Mgmt. fee | | | TER | | | Turnover | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 0.057 | -0.037 | 0.000 | 0.628*** | 0.678*** | 0.000 | 0.251*** | 0.306*** | 0.000 | -0.090 | -0.080 | 0.000 |
| | (0.791) | (-0.488) | (.) | (29.291) | (14.740) | (.) | (8.189) | (6.194) | (.) | (-1.027) | (-1.003) | (.) |
| Post | 0.048+ | 0.035 | 0.000 | -0.019* | -0.017*** | 0.000 | -0.054*** | -0.037*** | 0.000 | -0.015 | -0.046* | 0.000 |
| | (1.800) | (1.373) | (.) | (-2.343) | (-5.888) | (.) | (-4.704) | (-8.943) | (.) | (-0.471) | (-2.207) | (.) |
| SE x Post | -0.053 | -0.023 | -0.019 | -0.023 | -0.040 | -0.043 | 0.032 | 0.007 | 0.005 | -0.040 | 0.018 | 0.029 |
| | (-0.515) | (-1.296) | (-1.214) | (-0.739) | (-1.387) | (-1.500) | (0.731) | (0.237) | (0.434) | (-0.317) | (0.298) | (0.462) |
| Fund size | -0.031*** | -0.085* | -0.104+ | -0.037*** | -0.003 | 0.016* | -0.081*** | -0.057*** | -0.047*** | -0.031*** | -0.032** | -0.035 |
| | (-6.256) | (-2.145) | (-1.776) | (-23.895) | (-0.674) | (2.458) | (-37.397) | (-8.010) | (-15.720) | (-5.295) | (-2.816) | (-1.065) |
| Constant | 0.309*** | 0.799* | 0.927+ | 0.946*** | 0.637*** | 0.534*** | 1.674*** | 1.427*** | 1.396*** | 1.009*** | 1.038*** | 1.053*** |
| | (6.573) | (2.264) | (1.936) | (64.574) | (15.845) | (9.751) | (82.090) | (22.628) | (54.727) | (18.187) | (9.706) | (3.856) |
| Obs | 5915 | 5915 | 5915 | 5710 | 5710 | 5710 | 5822 | 5822 | 5822 | 5745 | 5745 | 5745 |
| Funds/CIKs | | 1223 | 1223 | | 1156 | 1156 | | 1181 | 1181 | | 1153 | 1153 |
| R2-within | | 0.010 | 0.011 | | 0.018 | 0.035 | | 0.099 | 0.113 | | 0.004 | 0.005 |
| R2-between | | 0.009 | 0.010 | | 0.248 | 0.109 | | 0.213 | 0.205 | | 0.003 | 0.003 |

*Panel B: Fund performance*

| | Alpha | | | Sharpe Ratio | | | Fee Revenue | | | Abnormal Return | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 1.929*** | 1.929*** | 0.000 | 0.842*** | 1.222*** | 0.000 | 46.854*** | 42.188*** | 0.000 | 9.561*** | 9.561*** | 0.000 |
| | (11.365) | (11.871) | (.) | (3.725) | (14.997) | (.) | (16.415) | (5.676) | (.) | (15.790) | (14.572) | (.) |
| Post | 1.156*** | 1.156*** | 0.000 | -2.550*** | -2.330*** | 0.000 | -1.581 | -0.740* | 0.000 | 3.150*** | 3.145*** | 0.000 |
| | (18.703) | (16.702) | (.) | (-30.952) | (-30.382) | (.) | (-1.535) | (-1.971) | (.) | (14.277) | (17.537) | (.) |
| SE x Post | -1.953*** | -1.953*** | -2.075*** | 0.577+ | 0.358*** | 0.353*** | 20.117*** | 18.234*** | 18.203*** | -4.513*** | -4.587*** | -5.126*** |
| | (-8.064) | (-9.689) | (-10.065) | (1.787) | (3.707) | (3.884) | (4.940) | (3.714) | (3.697) | (-5.223) | (-6.092) | (-6.815) |
| Fund size | 0.057*** | 0.057*** | 0.164** | -0.034* | -0.024 | -0.089 | 7.512*** | 6.485*** | 6.028*** | 0.173*** | 0.179*** | 0.607** |
| | (4.898) | (4.912) | (2.705) | (-2.187) | (-0.703) | (-1.117) | (38.310) | (11.714) | (7.729) | (4.141) | (3.770) | (2.809) |
| Constant | -1.295*** | -1.295*** | -2.492*** | 1.008*** | 0.534+ | 2.133** | -47.488*** | -38.960*** | -33.401*** | -8.280*** | -8.317*** | -16.029*** |
| | (-11.812) | (-11.185) | (-4.844) | (6.883) | (1.842) | (3.179) | (-25.838) | (-8.919) | (-4.997) | (-21.126) | (-17.844) | (-8.731) |
| Obs | 5914 | 5914 | 5914 | 5905 | 5905 | 5905 | 5692 | 5692 | 5692 | 5905 | 5905 | 5905 |
| Funds/CIKs | | 1210 | 1210 | | 1208 | 1208 | | 1152 | 1152 | | 1208 | 1208 |
| R2-within | | 0.071 | 0.163 | | 0.186 | 0.562 | | 0.124 | 0.131 | | 0.042 | 0.192 |
| R2-between | | 0.023 | 0.015 | | 0.265 | 0.411 | | 0.268 | 0.209 | | 0.142 | 0.012 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

**Table C3.** Diff-in-Diff Analysis, Forgiving US Sample

*Panel A: Fund costs*

| | Commission | | | Mgmt. fee | | | TER | | | Turnover | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 0.087*** | 0.086*** | 0.000 | 0.659*** | 0.684*** | 0.000 | 0.301*** | 0.308*** | 0.000 | -0.119 | -0.111 | 0.000 |
| | (7.694) | (6.033) | (.) | (29.273) | (14.670) | (.) | (9.394) | (6.165) | (.) | (-1.168) | (-1.287) | (.) |
| Post | 0.001 | 0.003 | 0.000 | -0.001 | -0.011** | 0.000 | -0.017 | -0.023*** | 0.000 | -0.001 | -0.053* | 0.000 |
| | (0.224) | (0.712) | (.) | (-0.056) | (-3.088) | (.) | (-1.155) | (-4.866) | (.) | (-0.028) | (-2.097) | (.) |
| SE x Post | -0.013 | -0.009 | -0.005 | -0.038 | -0.047 | -0.051*** | -0.001 | -0.006 | -0.008 | -0.053 | 0.022 | 0.028 |
| | (-0.817) | (-0.939) | (-0.482) | (-1.150) | (-1.640) | (-5.447) | (-0.021) | (-0.211) | (-0.702) | (-0.362) | (0.352) | (0.362) |
| Fund size | -0.013*** | -0.018*** | -0.045*** | -0.047*** | 0.000 | 0.029*** | -0.092*** | -0.057*** | -0.041*** | -0.032*** | -0.021 | 0.014 |
| | (-13.732) | (-4.640) | (-12.190) | (-23.680) | (0.020) | (8.360) | (-33.395) | (-6.416) | (-10.378) | (-3.833) | (-1.337) | (0.548) |
| Constant | 0.142*** | 0.183*** | 0.403*** | 0.989*** | 0.608*** | 0.441*** | 1.704*** | 1.430*** | 1.330*** | 1.044*** | 0.990*** | 0.690*** |
| | (16.513) | (5.216) | (13.602) | (55.403) | (11.659) | (15.907) | (69.168) | (18.924) | (41.329) | (13.942) | (7.321) | (3.315) |
| Obs | 4043 | 4043 | 4043 | 3893 | 3893 | 3893 | 3993 | 3993 | 3993 | 3939 | 3939 | 3939 |
| Funds/CIKs | | 826 | 826 | | 799 | 799 | | 817 | 817 | | 814 | 814 |
| R2-within | | 0.043 | 0.045 | | 0.018 | 0.043 | | 0.062 | 0.075 | | 0.002 | 0.004 |
| R2-between | | 0.104 | 0.068 | | 0.279 | 0.147 | | 0.243 | 0.218 | | 0.004 | 0.007 |

*Panel B: Fund performance*

| | Alpha | | | Sharpe Ratio | | | Fee Revenue | | | Abnormal Return | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 1.604*** | 1.604*** | 0.000 | 0.762*** | 0.749*** | 0.000 | 45.361*** | 41.097*** | 0.000 | 9.169*** | 9.201*** | 0.000 |
| | (10.465) | (9.925) | (.) | (3.548) | (13.035) | (.) | (14.711) | (5.542) | (.) | (14.408) | (13.797) | (.) |
| Post | 0.779*** | 0.779*** | 0.000 | -2.601*** | -2.573*** | 0.000 | -0.367 | 0.118 | 0.000 | 2.449*** | 2.428*** | 0.000 |
| | (11.485) | (11.889) | (.) | (-27.360) | (-27.231) | (.) | (-0.273) | (0.267) | (.) | (8.689) | (12.250) | (.) |
| SE x Post | -1.579*** | -1.579*** | -1.696*** | 0.638* | 0.610*** | 0.698*** | 18.663*** | 17.296*** | 17.334*** | -3.806*** | -3.930*** | -4.570*** |
| | (-7.208) | (-7.895) | (-8.227) | (2.078) | (5.473) | (6.510) | (4.235) | (3.523) | (3.512) | (-4.183) | (-5.221) | (-5.994) |
| Fund size | 0.070*** | 0.070*** | 0.240*** | -0.074*** | -0.072* | 0.008 | 8.322*** | 6.816*** | 5.855*** | 0.147** | 0.167** | 0.899** |
| | (5.435) | (4.668) | (3.457) | (-4.097) | (-2.368) | (0.085) | (32.407) | (8.706) | (5.225) | (2.745) | (2.709) | (3.009) |
| Constant | -1.067*** | -1.067*** | -2.797*** | 1.393*** | 1.382*** | 1.372+ | -52.193*** | -40.351*** | -29.662** | -7.691*** | -7.859*** | -18.194*** |
| | (-9.273) | (-8.162) | (-4.956) | (8.622) | (5.940) | (1.731) | (-22.716) | (-6.785) | (-3.213) | (-16.062) | (-14.556) | (-7.631) |
| Obs | 4024 | 4024 | 4024 | 4016 | 4016 | 4016 | 3900 | 3900 | 3900 | 4016 | 4016 | 4016 |
| Funds/CIKs | | 815 | 815 | | 814 | 814 | | 795 | 795 | | 814 | 814 |
| R2-within | | 0.044 | 0.105 | | 0.218 | 0.576 | | 0.120 | 0.132 | | 0.024 | 0.229 |
| R2-between | | 0.091 | 0.013 | | 0.140 | 0.172 | | 0.286 | 0.224 | | 0.161 | 0.007 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

**Table C4.** Diff-in-Diff Analysis, Clean US Sample

*Panel A: Fund costs*

| | Commission | | | Mgmt. fee | | | TER | | | Turnover | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 0.073*** | 0.076*** | 0.000 | 0.574*** | 0.566*** | 0.000 | 0.244*** | 0.210*** | 0.000 | 0.106+ | 0.157+ | 0.000 |
| | (6.004) | (4.808) | (.) | (20.262) | (11.475) | (.) | (6.629) | (3.747) | (.) | (1.665) | (1.815) | (.) |
| Post | 0.001 | -0.006 | 0.000 | 0.004 | -0.017* | 0.000 | -0.017 | -0.026*** | 0.000 | 0.025 | 0.036 | 0.000 |
| | (0.126) | (-0.615) | (.) | (0.141) | (-2.250) | (.) | (-0.511) | (-3.486) | (.) | (0.454) | (1.175) | (.) |
| SE x Post | -0.012 | -0.001 | 0.019 | -0.036 | -0.033 | -0.046 | 0.008 | 0.004 | 0.002 | -0.074 | -0.059 | -0.048 |
| | (-0.691) | (-0.039) | (1.550) | (-0.858) | (-1.080) | (-1.474) | (0.140) | (0.140) | (0.050) | (-0.784) | (-0.937) | (-0.799) |
| Fund size | -0.016*** | -0.019*** | -0.085*** | -0.062*** | -0.029*** | 0.030+ | -0.115*** | -0.088*** | -0.062** | -0.043*** | -0.041+ | -0.032 |
| | (-9.062) | (-4.475) | (-4.798) | (-14.600) | (-3.399) | (1.922) | (-21.088) | (-6.860) | (-2.665) | (-4.673) | (-1.914) | (-0.268) |
| Constant | 0.179*** | 0.200*** | 0.706*** | 1.182*** | 0.936*** | 0.715*** | 1.934*** | 1.752*** | 1.634*** | 0.896*** | 0.873*** | 0.859 |
| | (11.845) | (5.097) | (5.476) | (33.157) | (12.941) | (6.172) | (41.954) | (15.297) | (9.735) | (11.611) | (4.952) | (0.995) |
| Obs | 1130 | 1130 | 1130 | 1111 | 1111 | 1111 | 1125 | 1125 | 1125 | 1091 | 1091 | 1091 |
| Funds/CIKs | | 274 | 274 | | 271 | 271 | | 273 | 273 | | 273 | 273 |
| R2-within | | 0.075 | 0.097 | | 0.018 | 0.057 | | 0.048 | 0.059 | | 0.004 | 0.009 |
| R2-between | | 0.160 | 0.077 | | 0.443 | 0.192 | | 0.327 | 0.287 | | 0.037 | 0.024 |

*Panel B: Fund performance*

| | Alpha | | | Sharpe Ratio | | | Fee Revenue | | | Abnormal Return | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE | OLS | RE | FE |
| SE | 1.466*** | 1.466*** | 0.000 | 0.431*** | 0.431*** | 0.000 | 23.667*** | 24.358*** | 0.000 | 4.675*** | 4.749*** | 0.000 |
| | (7.769) | (7.302) | (.) | (3.634) | (6.811) | (.) | (5.030) | (3.480) | (.) | (7.459) | (6.128) | (.) |
| Post | 0.446** | 0.446* | 0.000 | -0.975*** | -0.975*** | 0.000 | -3.210 | -0.555 | 0.000 | 0.471 | 0.554 | 0.000 |
| | (2.710) | (2.258) | (.) | (-9.414) | (-8.832) | (.) | (-0.791) | (-0.639) | (.) | (0.862) | (0.945) | (.) |
| SE x Post | -1.250*** | -1.250*** | -1.639*** | -1.021*** | -1.021*** | -0.887*** | 19.072** | 15.835*** | 14.766** | -1.891* | -2.067* | -3.400*** |
| | (-4.493) | (-4.573) | (-5.169) | (-5.840) | (-8.301) | (-7.570) | (2.751) | (3.387) | (3.271) | (-2.047) | (-2.214) | (-3.380) |
| Fund size | 0.081** | 0.081** | 0.711** | 0.055** | 0.055*** | 0.318** | 16.505*** | 15.729*** | 13.744*** | 0.397*** | 0.400*** | 2.459** |
| | (2.934) | (3.252) | (3.016) | (3.175) | (3.507) | (2.699) | (24.241) | (9.195) | (5.507) | (4.338) | (4.185) | (3.093) |
| Constant | -1.011*** | -1.011*** | -4.788** | 0.740*** | 0.740*** | 0.299 | -93.137*** | -90.479*** | -70.041*** | -5.096*** | -5.177*** | -18.863** |
| | (-4.361) | (-4.571) | (-2.775) | (5.077) | (5.583) | (0.347) | (-16.211) | (-7.714) | (-3.668) | (-6.620) | (-6.128) | (-3.249) |
| Obs | 1121 | 1121 | 1121 | 1121 | 1121 | 1121 | 1085 | 1085 | 1085 | 1121 | 1121 | 1121 |
| Funds/CIKs | | 266 | 266 | | 266 | 266 | | 260 | 260 | | 266 | 266 |
| R2-within | | 0.028 | 0.088 | | 0.207 | 0.703 | | 0.180 | 0.220 | | 0.015 | 0.043 |
| R2-between | | 0.121 | 0.003 | | 0.257 | 0.278 | | 0.431 | 0.408 | | 0.145 | 0.012 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

**Table C5.** Analysis of Performance on Fund Commissions, Lagged Variables

| *Panel A: Investment Research Costs (Ratio) and Performance* | | | | |
|---|---|---|---|---|
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Research Ratio (Lag) | 0.753 | -0.774 | 0.466 | -6.500 |
| | (0.227) | (-0.720) | (0.080) | (-0.932) |
| Constant | -4.215** | -0.834* | -19.726*** | -7.575 |
| | (-2.980) | (-2.139) | (-5.074) | (-1.808) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 325 | 325 | 268 | 325 |
| $R^2$ | 0.059 | 0.767 | 0.510 | 0.088 |
| adj. $R^2$ | 0.032 | 0.761 | 0.493 | 0.061 |
| *Panel B: Execution Costs per Trade and Performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Execution Costs per Trade (Lag) | 2.582 | 2.307** | 12.924* | -7.508 |
| | (0.892) | (3.095) | (2.246) | (-1.018) |
| Constant | -4.300** | -1.774*** | -25.345*** | -5.707 |
| | (-3.160) | (-4.297) | (-5.180) | (-1.360) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 296 | 296 | 256 | 296 |
| $R^2$ | 0.060 | 0.780 | 0.522 | 0.095 |
| adj. $R^2$ | 0.030 | 0.773 | 0.505 | 0.066 |
| *Panel C: Total Commissions and Performance* | | | | |
| | Alpha | Sharpe Ratio | Fee Revenue | Abnormal Return |
| Research Ratio (Lag) | -0.202 | -1.212 | -5.430 | -4.783 |
| | (-0.056) | (-1.235) | (-0.834) | (-0.755) |
| Execution Costs per Trade (Lag) | 1.967 | 2.276** | 14.272* | -8.377 |
| | (0.674) | (3.339) | (2.336) | (-1.176) |
| Constant | -4.301** | -1.700*** | -25.166*** | -5.331 |
| | (-2.810) | (-3.959) | (-4.979) | (-1.128) |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 278 | 278 | 240 | 278 |
| $R^2$ | 0.058 | 0.780 | 0.519 | 0.090 |
| adj. $R^2$ | 0.022 | 0.771 | 0.498 | 0.056 |

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

This table shows the results of the pooled OLS regressions specified in Eq. 3, but using $X_{it-1}$ instead of $X_{it}$. The regressions control for the natural logarithm of the lagged fund size, the natural logarithm of the lagged fund age, the natural logarithm of the lagged fund family size (total assets), a lagged dummy to indicate if it is managed by a bank, a lagged dummy to indicate if it invests in emerging markets, fund abnormal cumulative return (in %) estimated over the previous year, volatility of returns in the previous year, and dummies for years 2017 and 2018 (cf. Jiang and Verardo, 2018). The *t-statistics* are reported in parenthesis, and the standard errors are robust and clustered at the fund-level.

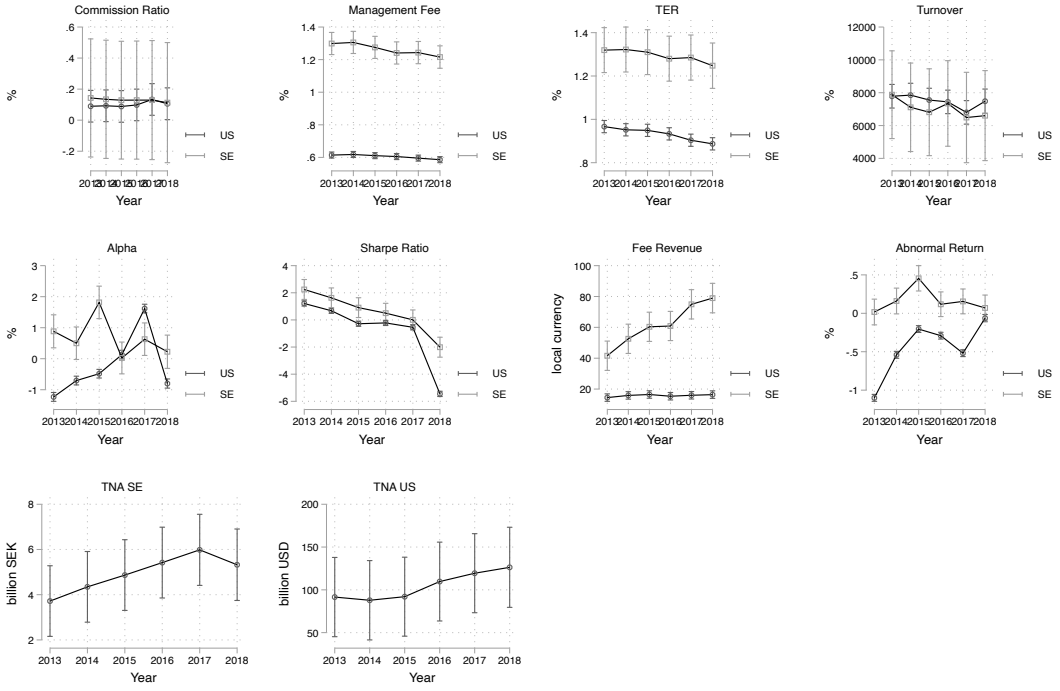


**Figure C.4.** All US Sample: Treatment vs. Control Equal-Weighted Yearly Averages

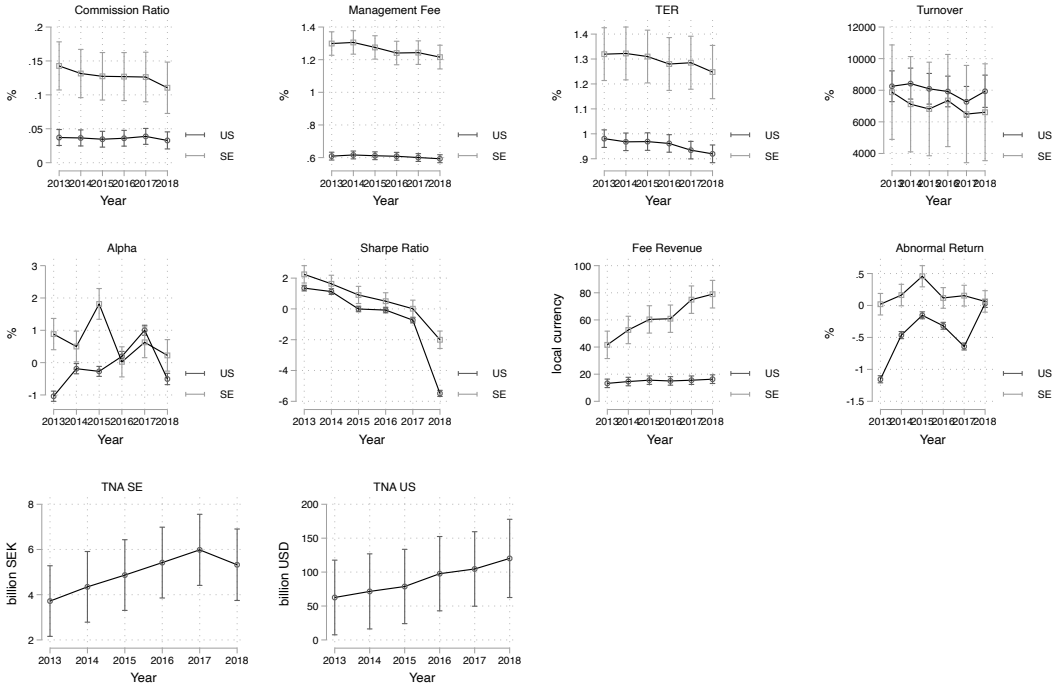


**Figure C.5.** Forgiving US Sample: Treatment vs. Control Equal-Weighted Yearly Averages