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# **Buy Low, Sell High: The Ability of Investors to Time Purchases and Sales of Mutual Funds**

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## SUMMARY

In a given period, the rates of return experienced by an investor who owns a mutual fund may deviate from returns calculated using the fund's underlying price and related distributions, if any. This difference between fund and investor returns ("performance gap") is driven by the timing of the investor's purchases or sales of the fund. Prior studies of the timing of aggregate cash flows into or out of US-based mutual funds find that investor returns are generally lower than fund returns due to poor timing of purchases and sales. Moreover, load funds, which generally levy a fee to compensate a broker for transaction services and advice, tend to have larger performance gaps than no-load funds. In 2017, we and a co-author found excess performance gaps for investors in load funds, compared to investors in no-load funds, for the decade from 2007 through 2016. The excess gap was 1.12% per year for US equity funds and 0.63% across all fund categories.

Since 2016, two salient regulatory initiatives have affected the financial services industry. In 2016, the DOL finalized its Conflict-of-Interest Rule, which prompted the financial services industry to review potential conflicts of interest and update compensation practices. While that Conflict-of-Interest Rule was subsequently vacated, many of its features were retained by the SEC's Regulation Best Interest ("Reg BI"), which went into effect in June 2020. This study seeks to update the 2017 study by using mutual fund returns and cash flows to document the magnitude of the performance gap in load funds versus no-load funds since 2017.

Compared to our 2017 findings, we find that excess performance gaps between July 2020 and June 2023 have declined to 0.13% from 1.12% for US equity funds and are even negative overall (-0.11%). This means that, in the aggregate, investors in funds with a front or back load timed their transactions slightly better than other investors. This reduction in the excess performance gap is consistent with Reg BI's objective of enhancing the standard of conduct for broker-dealers to act in the best interest of retail customers and, for example, persuade their clients to refrain from return-chasing behavior. However, there are other potential explanations for the excess performance gap reduction. For example, the COVID-19 pandemic, which started in early 2020, may have played a role by forcing hardship sales of investments while also prompting millions of Americans to invest a portion of their stimulus payments.

We also find that the (now vacated) Conflict-of-Interest Rule and Reg BI effected change even prior to taking effect. Indeed, between January 2017 and June 2020, a transition period during which broker-dealers faced the prospect of stricter regulations, the reduction in excess performance gaps was even more pronounced (to -0.40% overall) than in the post-Reg BI period of July 2020 to June 2023.

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## 1. INTRODUCTION

For any particular period, rates of return experienced by investors may differ from returns based on share prices and distributions because investors buy and sell shares throughout the period. An investor who manages to “buy low and sell high” can realize above-market returns, whereas less fortunate timing of purchases and sales can result in below-market returns. The same is true for all investors collectively in a mutual fund and the aggregate net cash flows into and out of mutual funds. Several studies concluded that, on average, rates of return realized by investors in mutual funds are reduced due to suboptimal timing of purchases and sales (e.g., Friesen and Sapp, 2007; Bullard et al., 2008; Padmanabhan et al., 2017; Munoz and Vicente, 2018). The difference between the rate of return under a buy-and-hold strategy and actual returns realized by investors is called the performance gap. This performance gap has been found to be larger among load funds than among no-load funds. Loads may introduce a conflict between the investor’s interest and a broker’s own interest because funds generally use load proceeds to compensate brokers.

Prior analyses of excess performance gaps of load funds over no-load funds were based on data from 2016 or earlier. Since then, the Securities and Exchange Commission (“SEC”) promulgated Regulation Best Interest (“Reg BI”), which enhanced the standard of conduct for broker-dealers when they make a recommendation to a retail customer of any securities transaction (17 CFR 240.15I-1). Under Reg BI, the broker-dealer must act in the best interest of the retail customer, without placing their own interest ahead of the interest of the retail customer. Reg BI became effective on June 30, 2020 (SEC, 2020).<sup>1</sup> The central question that this study seeks to answer is whether the excess performance gap among load funds over no-load funds has narrowed or even closed in recent years.

Funds may charge several types of sales loads and other fees, defined as follows.<sup>2</sup>

- A front load is a one-time charge that investors pay at the time of purchase. It is also known as a sales charge or front-end load.
- A back load is a one-time charge that investors pay at the time of sale. It is also known as a deferred load, a surrender charge, or a back-end load.
- A level load is a recurring charge that investors pay for as long as they own fund shares. For example, a fund may charge 0.5% of invested assets annually. It is also known as a 12b-1 fee or distribution fee, and it is included in a fund’s expense ratio.

The distinction between load and no-load funds may be defined in several ways. In the loosest definition, a no-load fund is a fund that charges neither a front nor a back load, irrespective of any level load. Alternatively, a “legal” no-load fund charges no front or back load and a level load of at most 0.25%. The strictest alternative, a “pure” no-load fund, charges neither a front, nor a back, nor a level load. Our baseline analysis adopts the loosest definition of no-load funds, but we report results also under legal and pure definitions.

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<sup>1</sup> In addition, in 2016 the Department of Labor finalized its Conflict-of-Interest Rule (81 Fed. Reg. 20946–21002, April 8, 2016), which also enhanced the standard of conduct for brokers. While the Conflict-of-Interest Rule was vacated in *Chamber of Commerce v. U.S. Department of Labor*, Case No. 17-10238 (5th Cir. March 15, 2018), it may have had lasting effects on broker conduct (e.g., Szapiro, 2021).

<sup>2</sup> Also see Securities and Exchange Commission (Undated).

The remainder of this report is organized as follows. Section 2 discusses findings in the prior literature. Section 3 focuses on the period from 2007 to 2016 as analyzed by Padmanabhan, Panis, and Tardiff (2017) and replicated, insofar as possible with current data, in this study. Section 4 presents results of our analysis of investor timing on newer data through June 2023. Section 5 performs numerous sensitivity tests to check the robustness of our findings. Section 6 concludes.

## 2. PRIOR LITERATURE

Friesen and Sapp (2007) compare the average monthly return for a fund under a buy-and-hold strategy ("time-weighted return") with the internal rate of return for that fund ("dollar-weighted return" or "investor return") based on its initial assets, monthly inflows and outflows, and final assets. Specifically, the dollar-weighted rate of return of fund  $j$  between time 0 and  $T$  is the rate  $\bar{r}_j$  that solves:

$$A_{j,0}(1 + \bar{r}_j)^T + \sum_{t=1}^T F_{j,t}(1 + \bar{r}_j)^{T-t} = A_{j,T}$$

where  $A_{j,0}$  and  $A_{j,T}$  are assets under management of fund  $j$  at the beginning and end of the period of interest, respectively, and  $F_{j,t}$  is the net cash flow into fund  $j$  between time  $t-1$  and  $t$ . Net cash flows were calculated as:

$$F_{j,t} = A_{j,t} - A_{j,t-1}(1 + r_{j,t})$$

where  $r_{j,t}$  is the rate of return of fund  $j$  between time  $t-1$  and  $t$ . This calculation assumes that net cash flows occur at the end of the month; below we develop and evaluate an alternative assumption. If time is measured in months, as it is in Friesen and Sapp (2007) and our study,  $\bar{r}_j$  is the monthly dollar-weighted rate of return.

The monthly time-weighted return is equal to the geometric average of monthly returns,  $\sqrt[T]{\prod_{t=1}^T (1 + r_{j,t})} - 1$ , which is equivalent to the dollar-weighted return under a buy-and-hold strategy, where  $F_{j,t} = 0$ .

For the 7,125 equity mutual funds in their sample in 1991–2004, Friesen and Sapp (2007) calculate an average time-weighted return of 0.62% per month and an average dollar-weighted return of 0.49%. They attribute the difference between the two monthly returns ("performance gap") to the effects of investors attempting to time the market. That difference is 0.13% per month, or 1.56% annually.<sup>3</sup> The performance gap is much smaller for bond funds (0.02% per month) and money market funds (0.004% per month).

All calculations are performed at the fund level, so that the calculated rates of return and performance gaps reflect those of all investors in a fund combined. Individual investors may have fared better or worse than average.

Distinguishing load funds from no-load funds (based on front and back loads only), the authors demonstrate that the performance gap for equity mutual funds is twice as large for

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<sup>3</sup> Performance gaps in the literature and in this document are reported as percentage point differences, not relative differences.

load funds (0.16%) as for no-load funds (0.08%). The excess performance gap of load over no-load funds is 0.08% per month, or about 0.96% per year. In the words of Friesen and Sapp (2007 at 2807): "Load funds are typically purchased with the help of a broker or investment advisor, and our evidence suggests that those investors who are most likely relying on advice from a broker perform especially poorly from a timing standpoint."

The average rates of return and performance gaps presented by Friesen and Sapp (2007) weight all funds equally, irrespective of fund size. They show that larger funds tend to experience larger performance gaps, so that their results understate the performance gap on the average dollar invested in equity funds.

Friesen and Sapp (2007) find a positive relationship between risk-adjusted performance (as measured by 3-factor or 4-factor alpha) and performance gap.<sup>4</sup> This means that better fund performance was generally offset by worse timing errors.

Finally, Friesen and Sapp (2007) note that their findings are consistent with return-chasing investment behavior, and, in particular, with asymmetric return chasing in which investors flee from low returns and respond randomly to high returns.

Several studies have applied the methods of Friesen and Sapp (2007) to newer data or different fund classifications.

Bullard, Friesen, and Sapp (2008) explore various definitions of load funds, such as based on front and back load only or including funds with level 12b-1 loads in excess of 0.25%, and based on share classes. Share class A funds generally charge a front load, class B funds a back load, and class C funds neither a front nor back load but a relatively high 12b-1 fee.<sup>5</sup> They find that the average performance gap of Class B funds (2.28%) is greater than that of Class A and C funds (1.62% and 1.33%, respectively), and that it is smaller for pure no-load funds (0.78%) than for legal no-load funds (1.91%). Indeed, legal no-load (i.e., funds that charge a level load up to 0.25% but no front or back loads), but not pure no-load funds, experience performance gaps approximately equal to those of funds that charge front or back loads.

Based on data from 1999 to 2011, Navone and Pagani (2015) similarly find larger excess gaps for investors in funds with a back load than in funds with a front load. However, a multivariate regression that controlled for fund flows reversed the differential for funds with a back load.

Padmanabhan, Panis, and Tardiff (2017) (hereafter, "PPT") update the earlier analyses with newer data and more fund types. For 9,978 US equity funds in their data, they calculate an average excess performance gap of load funds over no-load funds of 1.12% per year from 2007 to 2016. Recall that Friesen and Sapp (2007) find approximately 0.96% per year for equity funds from 1991 to 2004. Even apart from the different period of interest, the two study methods are not strictly comparable. However, their slight differences in approach aside, PPT demonstrate that excess performance gaps of load funds over no-load funds continued in 2007–2016.

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<sup>4</sup> See Fama and French (1993) for the 3-factor alpha model and Carhart (1997) for the 4-factor alpha model.

<sup>5</sup> See the Appendix of Padmanabhan, Panis, and Tardiff (2017) for more details.

PPT also calculate annual excess performance gaps among international equity funds (0.69%), balanced funds (0.50%), target date funds (-0.50%), and bond funds (0.04%). On average across all fund categories, they find an excess performance gap of 0.63%.<sup>6</sup>

Munoz and Vicente (2018) similarly compare the performance gap for load and no-load investors using a sample of US domestic equity mutual fund data spanning January 1990 to January 2016. They find average performance gaps among load and no-load funds of 2.12% and 1.50% per year, respectively, i.e., an excess performance gap of load over no-load funds of 0.62% per year.

Several other studies confirm that dollar-weighted returns tend to lag behind time-weighted returns, but do not calculate excess performance gaps of load over no-load funds. For example, Bessembinder, Cooper, and Zhang (2022) find an average performance gap of about 1.08% per year for the period from 1991 to 2020. Horstmeyer (2023) confirms the presence of a performance gap across all asset classes for 2012–2023. Further, he finds that the gap is generally larger in years that the S&P 500 declined (except among fixed income, emerging markets, and value equity funds) and in years with high volatility. In the most recent iteration of its annual report on performance gaps, Morningstar (2023) finds a 1.7% average performance gap for mutual funds and ETFs for 2013–2022. They find generally narrower gaps for funds with lower volatility and, to a lesser extent, in funds with lower expense ratios. They also note that 10-year performance gaps are consistent with gaps over the four previous rolling 10-year periods.

While not directly addressing performance gaps of mutual funds, several studies analyze features of financial advice in recent years. For example, based on a survey of financial advisors that was conducted after Reg BI took effect, Szapiro (2021) finds that an advisor paid on commission is 15% less likely than other advisors to consider fund fees as one of the top three criteria for recommending a fund to investors and 13% more likely to recommend active allocation strategies.

### **3. THE PERIOD FROM 2007 THROUGH 2016**

The main objective of this study is to update the 2007–2016 findings of PPT on excess performance gaps of load over no-load funds. Our analysis is based on the same data source, Morningstar Direct, which contains (1) monthly information on assets under management and rates of return and (2) fund-level information on such features as sales loads, share class, asset category, et cetera. Unfortunately, Morningstar provides only current fund-level information, which means that no historical information is available for this analysis. For example, investment objectives, fees, and initial investment minimums may have changed over time. Indeed, we were unable to exactly replicate the results for 2007–2016.

PPT exclude funds that are not readily classified as equity, bond, or balanced funds, such as funds that invest in commodities, currencies, or options. They further exclude Institutional class funds, Retirement class funds, and funds with missing share class. Funds in their analysis managed \$8.7 trillion in assets as of the end of 2016. Applying the same exclusion criteria, we find total assets under management of only \$5.9 trillion as of the end of 2016. The difference appears to be due mostly to changes in share class designations between

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<sup>6</sup> The overall excess gap is equal to the asset-weighted average of excess gaps in PPT's Table 15.

early 2017, when PPT extracted their data, and late July 2023, when we extracted data.<sup>7</sup> In particular, many Institutional funds are currently available to retail investors, often with low minimum initial investments. Including Institutional funds but excluding funds with minimum initial investments in excess of \$3,000, total assets under management were very close to those in the PPT analysis: \$8.8 trillion as of the end of 2016. We chose the \$3,000 threshold because it results in aggregate assets that are close to those in the PPT analysis (\$8.7 trillion).

Based on these fund inclusion criteria and the legal definition of no-load funds, as also used by PPT, we calculate the following excess performance gaps for the period from 2007 through 2016 (Table 1).<sup>8</sup>

**Table 1. Performance Gaps Based on Data as Close as Possible to Those of PPT, by Fund Category (2007–2016)**

Fund Category	All Funds	Legal Load Funds	Legal No-Load Funds	Excess Performance Gap
US Equity and Sector	0.84%	1.42%	0.55%	0.87%
International Equity	1.12%	1.44%	0.89%	0.55%
Balanced	0.71%	0.70%	0.72%	-0.01%
Target Date	-0.65%	-1.06%	-0.61%	-0.45%
Bond	0.37%	0.37%	0.38%	-0.01%
<b>Total</b>	<b>0.70%</b>	<b>1.04%</b>	<b>0.49%</b>	<b>0.55%</b>

Excludes funds with minimum initial investment in excess of \$3,000, Retirement class funds, and funds with missing share class.

The results are similar to those reported by PPT, but not identical for the reasons outlined above. Overall, PPT calculate an average excess performance gap of 0.63%, compared with 0.55% in our current analysis. The results are similar for US equity and sector funds (1.12% versus 0.87%), international equity funds (0.69% versus 0.55%), target date funds (-0.50% versus -0.45%), and bond funds (0.04% versus -0.01%), but not for balanced funds (0.50% versus -0.01%).

Mitchell, Sethi, and Szapiro (2019) argue that fund class designations are not always informative to identify conflicted advice in fund distribution. (They propose distinguishing funds based on their fee arrangements.) Indeed, some funds with share class "A," "B," or "C" do not charge loads, while some "No Load" funds do. A potential explanation lies in incorrectly recorded share classes because some funds' share class designations in Morningstar Direct conflict with those listed on Morningstar webpages. Unlike PPT's, our baseline analysis therefore ignores share class designations. We include Institutional class funds, Retirement class funds, and funds with missing share class, but exclude funds with minimum initial investments in excess of \$3,000. Funds in our analysis managed \$9.5 trillion at the end of 2016 and \$13.2 trillion at the end of June 2023.

<sup>7</sup> An alternative explanation—that funds liquidated or merged—does not apply because Morningstar Direct retains information on funds that are no longer active.

<sup>8</sup> Throughout our analysis, performance gaps are calculated as the difference between annualized dollar- and time-weighted rates of return. Funds are weighted by assets under management to calculate average rates of return and performance gaps. Excess performance gaps are calculated as the difference between the average performance gap of load funds and the average performance gap of no-load funds.



Funds may charge a front, back, or level load to compensate brokers for facilitating transactions. While compensation practices may vary, front and back loads generally translate into one-time commissions, whereas level loads generally generate a stream of broker payments for as long as the investor holds the fund (e.g., ICI 2023). We hypothesize that conflicts of interest arising from regular payments are milder than for one-time commissions because one-time commissions create an incentive for the broker to recommend (or not discourage) trading. Our baseline analysis therefore defines load and no-load funds based on front and back loads only: a load fund is a fund with a nonzero maximum front or back load, and a no-load fund charges neither a front nor a back load.<sup>9</sup> As noted, this baseline definition differs from legal and pure no-load definitions; below we report results also for alternative definitions.

For comparison to Table 1, Table 2 shows performance gaps by fund category for 2007–2016, including Retirement class funds and funds with missing share class, and distinguishing load funds based on front or back load only. Excess performance gaps are generally higher than in Table 1. Both the inclusion of additional funds and the change in definition of no-load funds contribute to the widening of excess performance gaps (not shown).

**Table 2. Performance Gaps, by Fund Category (2007–2016)**

Fund Category	All Funds	Load Funds	No-Load Funds	Excess Performance Gap
US Equity and Sector	0.73%	1.55%	0.38%	1.17%
International Equity	1.05%	1.45%	0.80%	0.65%
Balanced	0.65%	0.81%	0.51%	0.30%
Target Date	-0.71%	-1.07%	-0.68%	-0.40%
Bond	0.38%	0.35%	0.40%	-0.05%
Total	0.62%	1.10%	0.38%	0.73%

Excludes funds with minimum initial investment in excess of \$3,000.

No-Load funds defined as funds that do not charge a front or back load.

#### 4. EXCESS PERFORMANCE GAPS IN RECENT YEARS

Table 3 shows assets under management at the end of June 2023 for funds in our analysis, by fund category. Unless explicitly stated otherwise, this section (1) excludes funds with a minimum initial investment in excess of \$3,000 and (2) defines no-load funds as funds that do not charge a front or back load.

<sup>9</sup> Loads may be reduced or waived for certain clients. Also, class B shares may be converted without load charges into class A shares after a certain number of years. The available data do not identify such arrangements, and do not track assets by arrangement.

**Table 3. Assets under Management, by Fund Category (6/30/2023)**

Fund Category	Load	No-Load	Total
US Equity and Sector	\$1,159 bn	\$5,293 bn	\$6,452 bn
International Equity	\$377 bn	\$1,788 bn	\$2,165 bn
Balanced	\$352 bn	\$541 bn	\$894 bn
Target Date	\$57 bn	\$1,266 bn	\$1,323 bn
Bond	\$418 bn	\$1,963 bn	\$2,381 bn
<b>Total</b>	<b>\$2,363 bn</b>	<b>\$10,851 bn</b>	<b>\$13,214 bn</b>

The analysis covers 16,644 funds that were active at the end of June 2023: 6,052 load funds (36%) and 10,592 no-load funds (64%). Their combined assets under management were \$13.214 trillion, of which \$2.363 trillion (18%) were invested in load funds and \$10.851 trillion (82%) in no-load funds. Load funds were relatively prevalent among balanced funds (39%) and relatively uncommon among target date funds (4%). The largest category, US equity and sector funds, managed \$6.452 trillion in assets, or 49% of the total.

Ideally, our analysis would target the same investments and investors as are targeted by regulators. A limitation of our study is that it is based on aggregate investments in mutual funds, which serve both retail and institutional investors, and both retirement and other investment goals. That said, retail investors own the large majority—roughly 79%—of mutual fund assets.<sup>10</sup>

Reg BI, which enhanced the standard of conduct for broker-dealers to retail investors, went into effect on June 30, 2020 (SEC, 2020). We hypothesize that the excess performance gap of load funds over no-load funds was narrower after than before Reg BI took effect. Table 4 shows average annualized rates of return and performance gaps over all fund categories for the three years since Reg BI took effect (July 2020 through June 2023).

**Table 4. Average Annualized Rates of Return and Performance Gaps for All Fund Categories (July 2020 through June 2023)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	17,592	8.00%	8.18%	-0.18%
Load funds	6,521	7.18%	7.45%	-0.27%
No-Load funds	11,071	8.20%	8.36%	-0.16%
Load minus No-Load (t-Statistic)				-0.11% (-3.94)

For both load and no-load funds, average dollar-weighted rates of return were higher than time-weighted returns, indicating that, collectively, investors timed their transactions well. The performance gap was more negative for load funds (-0.27%) than for no-load funds (-0.16%), so that the excess performance gap of load funds over no-load funds was negative (-0.11%). This means that, in the aggregate, investors in funds with a front or

<sup>10</sup> More precisely: in 2022, households held 79% of assets in US-registered investment companies, which include mutual funds, exchange-traded funds, closed-end funds, and unit investment trusts (ICI, 2022).

back load timed their transactions slightly better than other investors between July 2020 and June 2023.

Despite their timing advantage, investors in funds with a front or back load earned lower average rates of return (7.45%) than investors in funds without front or back loads (8.36%) because of a deficit in time-weighted returns (7.18% vs 8.20%). This deficit raises questions—not addressed in this study—about differences in risk profiles, expense ratios, and risk-adjusted returns between load and no-load fund options.

The Appendix contains tables with average rates of return and performance gaps separately for US equity and sector funds (Table 13), international equity funds (Table 14), balanced funds (Table 15), target date funds (Table 16), and bond funds (Table 17). Table 5 summarizes the (excess) performance gaps for each fund category.

**Table 5. Performance Gaps by Fund Category (July 2020 through June 2023)**

Fund Category	All Funds	Load Funds	No-Load Funds	Excess Performance Gap
US Equity and Sector	-0.54%	-0.44%	-0.56%	0.13%
International Equity	0.10%	-0.38%	0.22%	-0.60%
Balanced	-0.08%	-0.05%	-0.10%	0.04%
Target Date	0.38%	-0.46%	0.43%	-0.88%
Bond	0.17%	0.07%	0.20%	-0.13%
Total	-0.18%	-0.27%	-0.16%	-0.11%

Excess performance gaps vary substantially across fund categories. For US equity and sector funds, the excess gap was 0.13%—positive, but sharply narrower than for the period from 2007 through 2016 (1.17%; see Table 2). For balanced funds it was near-zero (0.04%), and for the other fund categories it was negative.

Our analysis focuses on the period since July 2020 because Reg BI took effect on June 30, 2020. The excess performance gap reduction is consistent with Reg BI's objectives of enhancing the standard of conduct for broker-dealers to act in the best interest of retail customers, such as by discouraging their clients from chasing returns. However, factors other than Reg BI may account for the observed reduction in the excess performance gap of load over no-load funds. For example, the COVID-19 pandemic, which started in early 2020, caused major disruptions to the economy. On the one hand, financial hardship may have forced households to sell mutual fund holdings. On the other hand, the U.S. federal government made approximately \$814 billion in cash payments to most Americans, beginning with a first round in mid-April 2020, a second round in early January 2021, and a third round in March 2021. Roughly \$100 billion of these payments is estimated to have been invested in the stock market (Greenwood, Laarits, and Wurgler, 2023). The timing and sheer magnitude of investment flows may have affected performance gaps independently of Reg BI.

In 2016, the DOL finalized its Conflict-of-Interest Rule, which prompted the financial services industry to review potential conflicts of interest and update compensation practices. While that Rule was vacated in 2018, the SEC shared DOL's objective of reducing conflicts of interest among financial advisors. The SEC finalized its Reg BI in 2019, and the financial services industry left in place many changes that they had made in response to DOL's regulation. The period from 2017 through the middle of 2020, when Reg BI became

effective, may be characterized as a transition period for the financial services industry. Table 6 shows average rates of return and performance gaps for all fund categories over that transition period.

**Table 6. Average Annualized Rates of Return and Performance Gaps for All Fund Categories (January 2017 through June 2020)**

	Number of funds	Time- weighted return	Dollar- weighted return	Performance gap
All funds	19,844	8.03%	8.07%	-0.04%
Load funds	7,854	7.39%	7.74%	-0.35%
No-Load funds	11,990	8.22%	8.17%	0.05%
Load minus No-Load (t-Statistic)				-0.40% (-23.78)

Somewhat surprisingly, the overall excess performance was even more negative (-0.40%) than for the post-Reg BI period (-0.11%). A potential explanation is that the uncertainty or the prospect of potentially facing stricter regulations caused brokers to be especially vigilant during the transition period.

The Appendix contains tables with average rates of return and performance gaps separately for US equity and sector funds (Table 18), international equity funds (Table 19), balanced funds (Table 20), target date funds (Table 21), and bond funds (Table 22). Table 7 summarizes the (excess) performance gaps for each fund category during the transition period.

**Table 7. Performance Gaps by Fund Category (January 2017 through June 2020)**

Fund Category	All Funds	Load Funds	No-Load Funds	Excess Performance Gap
US Equity and Sector	-0.16%	-0.51%	-0.06%	-0.45%
International Equity	0.16%	-0.56%	0.37%	-0.94%
Balanced	-0.06%	-0.22%	0.05%	-0.27%
Target Date	0.12%	-0.28%	0.15%	-0.42%
Bond	0.01%	0.04%	0.01%	0.03%
Total	-0.04%	-0.35%	0.05%	-0.40%

## 5. SENSITIVITY TESTS

PPT conducted various analyses to better understand the drivers of excess performance gaps. In light of the very mild or even negative excess performance gaps since Reg BI became effective, such decompositions are a lower priority. However, this section contains a number of sensitivity tests and robustness checks. We focus on the post-Reg BI period from July 2020 through June 2023.

### ***Definition of No-Load Funds***

Our baseline analysis defines no-load funds as funds that do not charge a front or back load. This is consistent with Friesen and Sapp (2007). However, funds that are distributed through brokers may charge a level load, also known as a 12b-1 fee, to compensate brokers. By our baseline definition, no-load funds may therefore be distributed by brokers. Under a stricter definition, “pure no-load funds” do not charge a front, back, or level load. In between our baseline definition and the pure definition are “legal no-load funds,” which do not charge a front or back load, but may charge a level load of at most 0.25%. PPT adopt the legal definition in their analysis.

Across all fund categories and as of June 2023, the number of load funds was 6,052 (baseline definition), 7,975 (legal definition), and 10,012 (pure definition). Their assets under management were \$2.363 trillion (baseline definition), \$2.690 trillion (legal definition), and \$2.997 trillion (pure definition). Most funds that are no-load funds under the baseline definition but load funds under the pure definition, i.e., funds that charge level loads only, are relatively small and Retirement class funds.

**Table 8. Excess Performance Gaps by No-Load Definition and Fund Category (July 2020 through June 2023)**

Fund Category	Excess Performance Gap		
	Baseline Definition	Legal Definition	Pure Definition
US Equity and Sector	0.13%	0.17%	0.02%
International Equity	-0.60%	-0.62%	-0.80%
Balanced	0.04%	0.02%	-0.12%
Target Date	-0.88%	-0.94%	-1.30%
Bond	-0.13%	-0.14%	-0.09%
Total	-0.11%	-0.11%	-0.23%

Table 8 shows excess performance gaps by definition of load and no-load funds. The excess gaps are similar across all three definitions. Under the pure definition, excess performance gaps tend to be smaller (less positive or more negative) than under the baseline and legal definitions. If excess performance gaps were positive, this pattern would be consistent with milder conflicts of interest associated with level loads than with front or back loads.

### ***Excluding Institutional, Retirement, or Missing Share Class Funds***

PPT exclude funds with Institutional, Retirement, or missing share class. Instead, our baseline analysis retains such funds but excludes funds with a minimum initial investment in excess of \$3,000. Funds with a minimum initial investment in excess of \$3,000 tend to be class Institutional (56%), “Other” (10%), Retirement (10%), or missing (5%).

Table 9 compares excess performance gaps by fund inclusion criterion. In addition to the baseline analysis, it shows excess gaps based on all funds (irrespective of minimum initial investment) and all funds except those with Institutional, Retirement, or missing share class.

**Table 9. Excess Performance Gaps by Fund Inclusion Criterion and Fund Category (July 2020 through June 2023)**

Fund Category	Analysis Funds		
	Baseline Analysis	Including Funds Irrespective of Minimum Initial Investment	Excluding Institutional, Retirement, and Missing Share Classes
US Equity and Sector	0.13%	-0.15%	0.23%
International Equity	-0.60%	-0.56%	-0.73%
Balanced	0.04%	-0.14%	0.20%
Target Date	-0.88%	-1.14%	-1.65%
Bond	-0.13%	-0.19%	-0.10%
<b>Total</b>	<b>-0.11%</b>	<b>-0.29%</b>	<b>-0.16%</b>

The third column includes funds irrespective of minimum initial investment and excludes share classes as noted.

The implications for excess performance gaps of including funds irrespective of minimum initial investment or excluding funds based on share class are mixed. However, even positive excess performance gaps tend to be small.

### ***Calculating Average Returns Unweighted by Assets***

Time- and dollar-weighted rates of return are calculated at the fund level. Similarly, performance gaps are calculated at the fund level. To compare groups of funds, such as load funds and no-load funds, the rates and gaps need to be averaged. Friesen and Sapp (2007) calculate unweighted average returns and performance gaps. They find that large funds tend to have larger excess performance gaps than small funds, so that their findings understate the performance gap of the average dollar invested in equity funds. PPT calculate averages weighted by assets under management, as we do in our baseline analysis.<sup>11</sup>

Table 10 shows excess performance gaps for weighted and unweighted averaging.

<sup>11</sup> More precisely: PPT weight by average assets under management, irrespective of the number of months a fund contributes to the calculation. We weight by average assets under management where the denominator is the number of months under study. If a fund was not active for the entire period, it is thus downweighted proportionally. The implications of that distinction are de minimis. An advantage of our weights is that fund mergers do not affect the overall results.

**Table 10. Excess Performance Gaps Weighted and Unweighted, by Fund Category (July 2020 through June 2023)**

Fund Category	Weighting	
	Baseline: Weighted	Unweighted
US Equity and Sector	0.13%	-0.64%
International Equity	-0.60%	-0.51%
Balanced	0.04%	-0.21%
Target Date	-0.88%	0.34%
Bond	-0.13%	-0.30%
Total	-0.11%	-0.36%

The overall unweighted excess performance gap is smaller (-0.36%) than the weighted excess gap (-0.11%). This is true also for US equity and sector funds, which is consistent with the observation of Friesen and Sapp (2007) that large equity funds tend to have larger excess performance gaps than small funds. For other fund categories, the changes are mixed.

### ***Assuming Alternative Timing of Fund Flows***

Data sources that support the calculation of performance gaps, such as Morningstar Direct and the CRSP Survivor-Bias Free US Mutual Fund Database, contain monthly information on rates of return and assets under management but not on net cash flows into or out of funds. A standard assumption in the literature is that net cash flows take place at the end of the month; see the equation for  $F_{j,t}$  on page 2. The true distribution of net cash flows may not be known, but perhaps a more realistic assumption is that the flows happen, on average, in the middle of the month. They would then earn returns during an extra one-half of a month, which may be approximated by solving for  $F_{j,t}$  in:

$$A_{j,t} = A_{j,t-1}(1 + r_{j,t}) + F_{j,t}\sqrt{1 + r_{j,t}}$$

Another alternative assumption is that flows occur at the beginning of the month:

$$A_{j,t} = (A_{j,t-1} + F_{j,t})(1 + r_{j,t})$$

Table 11 shows excess performance gaps by assumed timing of net cash flows.

**Table 11. Excess Performance Gaps by Assumed Timing of Net Cash Flows and Fund Category (July 2020 through June 2023)**

Fund Category	Timing of Net Cash Flows		
	Baseline: End of the Month	Middle of the Month	Start of the Month
US Equity and Sector	0.13%	0.15%	0.17%
International Equity	-0.60%	-0.62%	-0.64%
Balanced	0.04%	0.07%	0.09%
Target Date	-0.88%	-1.05%	-1.21%
Bond	-0.13%	-0.13%	-0.13%
Total	-0.11%	-0.12%	-0.13%

The implications of the timing assumption for excess performance gaps are minor, except for the effect on target date funds.

### ***Minimum Number of Monthly Records***

Our baseline analysis excludes funds with fewer than 12 monthly records during the period of interest. This is consistent with Friesen and Sapp (2007) and PPT.

Alternatively, Table 12 shows implications for excess performance gaps without any restriction on the number of monthly records and with the restriction that the fund must have been active for the entire 36 months under analysis (July 2020 through June 2023). Similarly, Morningstar (2023) includes only funds that were active for the entire duration of their 10-year analysis.<sup>12</sup>

**Table 12. Excess Performance Gaps by Minimum Monthly Records and Fund Category (July 2020 through June 2023)**

Fund Category	Minimum Required Monthly Records		
	Baseline: 12 months	No minimum	All 36 Months
US Equity and Sector	0.13%	0.13%	0.12%
International Equity	-0.60%	-0.60%	-0.63%
Balanced	0.04%	0.04%	0.04%
Target Date	-0.88%	-0.88%	-0.87%
Bond	-0.13%	-0.13%	-0.14%
Total	-0.11%	-0.11%	-0.12%

The implications of monthly record requirements are minimal. The numbers of funds in the analysis differ, from 18,703 (no minimum) to 17,592 (baseline) and 15,296 (all 36 months). Apparently, the timing experiences of marginal funds are similar to those of established funds or the assets under management are relatively small in their initial or final period.

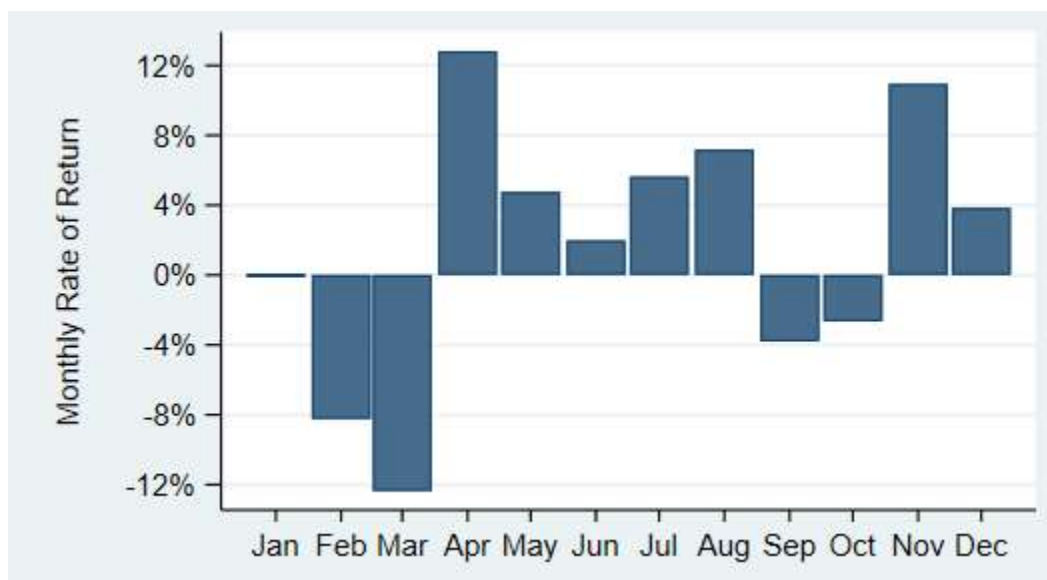
In sum, none of the robustness tests cast doubt on the overall conclusion that excess performance gaps are small or negative in the three years since Reg BI became effective.

## **6. CONCLUSION**

The performance gap between a fund's time- and dollar-weighted rates of return is generally interpreted as evidence of poor investment timing. Indeed, other authors have demonstrated that such a gap is consistent with return chasing and that gaps tend to be larger when fund prices are volatile and investors sell when prices are down. However, a performance gap may also arise from trading behavior that does not aim to buy low and sell high. For illustration consider the monthly rates of return on a large S&P 500 index fund during 2020 (Figure 1).

<sup>12</sup> Separately, Morningstar (2023) consolidates all funds in a single portfolio and calculates the performance gap for that portfolio. Most other studies calculate performance gaps for individual funds and report the average over funds.



**Figure 1. Monthly Rates of Return on a Large S&P 500 Index Fund (2020)**

In early 2020, equity prices dropped in anticipation of major disruptions to the economy due to the COVID-19 pandemic. They recovered soon after. The time-weighted annualized return for this fund was 18.37% in 2020.<sup>13</sup> Consider a hypothetical investor who held \$1,000 worth of shares in this fund at the beginning of 2020 and poured \$1,000 into the fund at the end of each month. The dollar-weighted rate of return for this investor was 39.73%, far greater than the time-weighted return. His investment did poorly in the first three months of the year, but the amount invested was relatively small. His investments did much better in later months, when more was invested. Overall, his investments did very well because *more was invested when monthly returns were high than when they were low*. This investor purchased new fund shares for the same amount every month, so it is difficult to argue that he was timing the market. Instead, his timing was fortunate because of the market trend. Likewise, a performance gap may arise from errors in active trading but also from unfortunate timing given market trends.

Did market trends from July 2020 through June 2023 perhaps contribute to the reduction of excess performance gaps relative to the pre-2017 period? Indeed, performance gaps may have been affected, but we see no reason to believe that load and no-load funds were affected differently. In other words, market trends do not appear to explain the reduction in performance gaps.

The COVID-19 pandemic may have influenced the inflows and outflows of funds in the financial markets. Events related to COVID-19 may have prompted some households to liquidate mutual fund holdings while spurring other households with excess cash (from reduced spending and stimulus payments) to invest. The timing of hardship liquidations and windfall investments was largely dictated by the sudden onset of COVID-19 disruptions and by discrete government cash injections. If these large-scale transactions had asymmetric effects on load and no-load funds, then they may have had an effect on excess performance gaps independently of Reg BI.

<sup>13</sup> The dollar-weighted return for this fund was 17.85% and its performance gap 0.52%. However, the text focuses on a hypothetical individual investor, not the collective investors in this fund.

It is unclear what drove the reduction of excess performance gaps, but the reduction is consistent with improved care by brokers to persuade their clients to refrain from return-chasing behavior. Investors in no-load funds continue to earn higher returns than their peers in load funds, but that premium is due to higher time-weighted returns and generally not to fewer timing errors or good fortune.

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## APPENDIX

This Appendix documents average annualized rates of return and performance gaps, by fund category, for the period after Reg BI took effect (July 2020 through June 2023) and for the regulatory transition period (January 2017 through June 2020). Throughout, funds with a minimum initial investment in excess of \$3,000 are excluded, and load funds are defined as funds that charge a front or back load, irrespective of any level load.

Tables 13–17 relate to the period from July 2020 through June 2023.

**Table 13. Average Annualized Rates of Return and Performance Gaps for US Equity and Sector Funds (July 2020 through June 2023)**

	Number of funds	Time- weighted return	Dollar- weighted return	Performance gap
All funds	6,238	12.44%	12.98%	-0.54%
Load funds	2,287	10.76%	11.19%	-0.44%
No-Load funds	3,951	12.83%	13.39%	-0.56%
Load - No-Load (t-Statistic)				0.13% (2.26)

**Table 14. Average Annualized Rates of Return and Performance Gaps for International Equity Funds (July 2020 through June 2023)**

	Number of funds	Time- weighted return	Dollar- weighted return	Performance gap
All funds	2,870	7.61%	7.50%	0.10%
Load funds	1,033	7.54%	7.92%	-0.38%
No-Load funds	1,837	7.62%	7.41%	0.22%
Load - No-Load (t-Statistic)				-0.60% (-8.43)

**Table 15. Average Annualized Rates of Return and Performance Gaps for Balanced Funds (July 2020 through June 2023)**

	Number of funds	Time- weighted return	Dollar- weighted return	Performance gap
All funds	1,474	6.55%	6.63%	-0.08%
Load funds	554	6.22%	6.28%	-0.05%
No-Load funds	920	6.76%	6.86%	-0.10%
Load - No-Load (t-Statistic)				0.04% (0.60)

**Table 16. Average Annualized Rates of Return and Performance Gaps for Target Date Funds (July 2020 through June 2023)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	2,145	6.99%	6.60%	0.38%
Load funds	463	6.22%	6.68%	-0.46%
No-Load funds	1,682	7.03%	6.60%	0.43%
Load - No-Load (t-Statistic)				-0.88% (-10.50)

**Table 17. Average Annualized Rates of Return and Performance Gaps for Bond Funds (July 2020 through June 2023)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	4,865	-1.56%	-1.74%	0.17%
Load funds	2,184	-0.63%	-0.70%	0.07%
No-Load funds	2,681	-1.79%	-1.99%	0.20%
Load - No-Load (t-Statistic)				-0.13% (-6.15)

Tables 18–22 relate to the period from January 2017 through June 2020.

**Table 18. Average Annualized Rates of Return and Performance Gaps for US Equity and Sector Funds (January 2017 through June 2020)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	7,227	10.54%	10.70%	-0.16%
Load funds	2,792	9.88%	10.39%	-0.51%
No-Load funds	4,435	10.72%	10.78%	-0.06%
Load minus No-Load (t-Statistic)				-0.45% (-15.19)

**Table 19. Average Annualized Rates of Return and Performance Gaps for International Equity Funds (January 2017 through June 2020)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	3,162	6.51%	6.35%	0.16%
Load funds	1,233	7.72%	8.29%	-0.56%
No-Load funds	1,929	6.15%	5.78%	0.37%
Load minus No-Load (t-Statistic)				-0.94% (-16.07)

**Table 20. Average Annualized Rates of Return and Performance Gaps for Balanced Funds (January 2017 through June 2020)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	1,744	6.76%	6.82%	-0.06%
Load funds	715	5.47%	5.69%	-0.22%
No-Load funds	1,029	7.68%	7.63%	0.05%
Load minus No-Load (t-Statistic)				-0.27% (-9.18)

**Table 21. Average Annualized Rates of Return and Performance Gaps for Target Date Funds (January 2017 through June 2020)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	2,344	7.58%	7.46%	0.12%
Load funds	579	7.14%	7.41%	-0.28%
No-Load funds	1,765	7.61%	7.46%	0.15%
Load minus No-Load (t-Statistic)				-0.42% (-10.24)

**Table 22. Average Annualized Rates of Return and Performance Gaps for Bond Funds (January 2017 through June 2020)**

	Number of funds	Time-weighted return	Dollar-weighted return	Performance gap
All funds	5,367	4.15%	4.13%	0.01%
Load funds	2,535	3.51%	3.47%	0.04%
No-Load funds	2,832	4.36%	4.36%	0.01%
Load minus No-Load (t-Statistic)				0.03% (1.55)

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