

ESSAYS IN FINANCIAL ECONOMICS

By

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To my family and friends
Your love and support have not gone unnoticed

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LIST OF ABBREVIATIONS

CRSP	The Center for Research in Security Prices
DC	Defined Contribution
DOL	Department of Labor
ERISA	Employee Retirement Income Security Act of 1974
ESG	Environmental, social, and governance
GAO	Government Accountability Office
ICI	Investment Company Institute
SAI	Statement of Additional Information
SCon	Socially Conscious
SRC	Socially Responsible Consumption / Consumer
SRI	Socially Responsible Investing / Investor

Abstract of Dissertation Presented to the Graduate School
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This dissertation examines two separate topics in financial economics. The first examines the behavior of mutual fund managers and how that behavior impacts fund performance. The second turns towards the retirement industry, and examines how the salience of disclosure affects the compensation of plan service providers. While both questions are related to investments in mutual funds, they form separate and distinct contributions to the financial economics literature.

The first part of this dissertation uses the laboratory of socially conscious mutual funds to answer a novel question: are the personal consumption habits of asset managers related to their investment performance? Using vehicle purchases as a proxy for mutual fund manager consumption habits, we find that authentic managers, whose personal consumption habits match their fund objective, outperform hypocrite managers, whose personal consumption habits do not match the fund objective, by 24 basis points per month. This performance differential is largely attributable to superior selection of environmentally driven holdings, with outperformance in the top tercile of environmental holdings averaging 27 basis points per month. We interpret these

findings as evidence that knowledge gained through consumption in product markets can be transferred to generate improved investment performance.

The second part of the dissertation analyzes the salience of disclosure in the context of defined benefit retirement plans. Using a unique regulatory setting, we explore whether revenue sharing payments from mutual funds to retirement plan service providers decline in the presence of more salient disclosure. The regulations, passed by the Department of Labor in 2012, require covered service providers to prospectively disclose both direct and indirect compensation that they receive in exchange for services to ERISA covered pension plans. We find that after the passage of these regulations, there is a substitution of direct fees for indirect fees, especially among small 401(k) plans that are likely to have naïve plan sponsors. We also document that total compensation for small plans declines by an average of 4.3 basis points (a decline of about 14% relative to the pre-2012 level), suggesting that salient disclosure of indirect fees mitigates price discrimination. In addition, we describe the response in the mutual fund industry. After the passage of regulation, we observe an increase in the demand for mutual funds that don't engage in revenue sharing, both in the creation of new, low-cost retirement share classes and in the movement of flows away from share classes that charge 12b-1 fees. Finally, we find that retirement plan menus changed in response to heightened disclosure, with a decrease in the average expense ratio and the addition of low cost investment options made available to participants.

CHAPTER 1 INTRODUCTION

This dissertation examines two questions in financial economics. In the first part of the dissertation, we analyze how the personal consumption habits of mutual fund managers are related to their fund's performance. While existing literature demonstrates the role of prior professional experience, we extend the body of knowledge into fund managers' personal choices. The results we discuss have important investment implications for mutual fund investors, and provide us with a better understanding of the relationship between the personal lives of asset managers and their employment performance. In the second part of this dissertation, we turn our attention to relationships between defined benefit retirement plan sponsors, service providers, and mutual funds. We demonstrate the important role that salient disclosure can play in reducing information asymmetries and potentially alleviating conflicts of interest. This work is relevant for policymakers and regulatory bodies and also provides a novel empirical test of recent theoretical work on the differing behavior of naïve and wary consumers.

Overview of Chapter 2

A rapidly growing segment of the market today is socially responsible investment. While existing literature examines the performance implications of socially responsible investing, we use socially responsible investment as a laboratory to determine whether the personal consumption habits of mutual fund managers are related to their fund performance. Using a relatively unknown dataset of vehicle purchases scraped from VIN.place, we identify mutual fund managers with socially responsible consumption habits, proxied for by the purchase of a hybrid or electric car. We show that when

mutual fund managers have consumption habits aligned with their fund objective, which we term authentic managers, they outperform their hypocrite peers by a statistically significant margin. The outperformance is driven primarily by improved security selection skills among environmentally oriented stocks, suggesting that familiarity with or “dedication to the cause” of socially responsibility is related to success managing a socially responsible fund. This is important information both for investors interested in social responsibility, and to better our understanding of the relationship between personal choices and work performance.

Overview of Chapter 3

Most retirement plans in the United States employ external companies to assist with operating the plan. These external companies, referred to as third-party service providers, are responsible for various fund tasks and receive compensation, broadly, in one of two ways. First, they receive compensation directly from the plan sponsor or plan participants. Second, they can receive what is known as “indirect” compensation, which is typically paid by investment providers offering mutual funds on the plan menu. The nature of this indirect compensation has the potential to create conflicts of interest and has raised concern among government regulators, motivating the Department of Labor to introduce new disclosure regulations to the Employee Retirement Income Security Act of 1974. We examine the impact of these disclosure regulations and argue that disclosure salience is an important determinant of policy effectiveness. We demonstrate that more salient disclosure was effective in reducing indirect fees paid to service providers and causing a shift from indirect to direct compensation. The decline in total compensation that we observe among small plans also indicates that this more salient disclosure was effective at mitigating price discrimination among retirement plan

sponsors. We also document the response in the mutual fund industry, with increased demand for non-revenue-sharing fund classes, both in the creation of new low-cost share classes and a movement of flows away from fee-bearing share classes. Finally, we document how plan menus changed in response to the heightened disclosure requirements. We observe a decline in the average expense ratio and approximately one new low-cost mutual fund being added to the plan menu. These results provide evidence of the important role that salient disclosure can play in financial markets regulation.

CHAPTER 2 CONSUMPTION HABITS OF MUTUAL FUND MANAGERS: DRIVING GREEN TO MAKE GREEN

Motivation

Socially responsible investing is an increasingly important and rapidly growing segment of the U.S. investment market. Indicators of corporate social responsibility at the company level, such as measures from KLD Research & Analytics, allow socially responsible investors to choose socially conscious companies to invest in. In addition, socially responsible mutual funds (SRMF) have emerged as a fast-growing group of funds; recent outperformance coupled with societal tastes have led to record inflows into the sector.¹ The existing academic research on socially responsible investing (SRI) has largely been focused on its performance implications. These studies' conclusions are mixed, with some studies suggesting that SRI underperforms (see Rudd, 1981, Hong and Kacperczyk, 2009, and Fabozzi, Ma, and Oliphant 2008), while others suggest that SRI neither out- nor underperforms (see Hamilton, Jo, and Statman, 1993 and Statman, 2000).² Some papers actually highlight the performance benefits of investing on non-economic criterion (Derwall et al. 2005, Edmans 2011, and Fornell et al. 2006). In this paper, we use socially responsible investing as a laboratory to tackle a slightly different question: do socially responsible investors, specifically SRMF

¹ In 2016, the Wall Street Journal reported that the number of socially responsible investment funds has grown from 200 in 2005 to close to 1,000 in 2014. In a different article from 2015, the Journal reported that total assets in [socially responsible] funds had grown roughly 59% over the past five years to \$72.6 billion, while assets in all mutual funds had risen 52% to \$12.5 trillion. (See "Does Socially Responsible Investing Make Financial Sense?" and "Investors Follow Their Conscience," *Wall Street Journal*, Feb. 28th 2016 and July 17th 2015, respectively).

² Statman (2000) empirically analyzes the performance of both socially responsible stocks and socially responsible mutual funds and concludes that "an index of socially responsible stocks...did as well as the S&P 500 Index over the 1990-98 period. Socially responsible mutual funds did worse than the S&P 500...but no worse than conventional mutual funds."

managers, who also have socially responsible consumption habits (SRC), termed authentic investors, perform differently from socially responsible investors with regular consumption habits, non-pejoratively termed hypocrite investors?

We use fund manager automobile purchase decisions to proxy for socially responsible consumption habits. Specifically, managers who buy a hybrid or electric vehicle are deemed to have socially responsible consumption habits, while managers who buy other vehicles are deemed regular consumers. We select automobile purchases as our proxy because they are among the largest purchases individuals make. Additionally, socially responsible automobile purchases are correlated with other socially responsible consumption behaviors (see Whitmarsh and O'Neill, 2010). Finally, automobile purchase data is available from governmental and other sources, and conveniently compiled in a name searchable format at VIN.place. Using car purchase data merged together with mutual fund data, including fund classification, holdings, and performance data from Morningstar and the Center for Research in Security Prices (CRSP), we analyze the empirical relationship between socially responsible consumption and socially responsible investing.

The broad competing hypotheses in our paper are:

H1: Authentic managers (SRIs with SRC) perform better than hypocrite managers (SRIs with regular consumption habits). Better performance may arise because authentic managers are more familiar with socially responsible products and companies that provide them through their consumption of such products or because

consumption decisions are correlated with dedication to the cause of social responsibility, which in turn results in greater familiarity.

H2: Authentic managers perform worse than hypocrite managers because they are ideologically predisposed to socially responsible products, and therefore less objective in evaluating such investments.

The first hypothesis, that authentic managers outperform hypocrite managers, is based on the idea that personal experience positively impacts professional performance. The idea is that familiarity with product markets will allow for better investment decisions. This is consistent with recent empirical work in other contexts such as Bradley, Gokkaya, & Liu (2016), who show that analysts with prior industry experience outperform their inexperienced peers, and Kostovestky and Ratushny (2017), who show that specialists with prior health-related education or experience outperform their generalist peers in managing healthcare investment funds.

The second hypothesis suggests that authentic investors are likely to allocate more of their portfolios to SRIs, and to do so indiscriminately. This hypothesis is consistent with the well-known home bias in investing.³ Empirical evidence has shown that investors prefer to invest in local, familiar companies despite the fact that these investment decisions often result in underperformance and unnecessarily bearing diversifiable risk (see, for example, Tesar and Werner, 1995, and Hochberg and Rauh, 2013). Additionally, this hypothesis is also consistent with a number of recent studies that suggest that more familiar and visible stocks perform worse than their less familiar

³ The literature on home bias in investing shows that investors overweight investments in their own country and has been extended to other geographical regions. See, for example, French and Poterba (1991) and Coval and Moskowitz (1999).

counterparts (see, for example, Statman, Fisher, and Anginer, 2008, Anginer and Statman, 2010, and Da, Engelberg, and Gao, 2011). In the context of our study, this bias may present as follows: an authentic manager, who makes personal consumption decisions that reveal a strong personal preference for social responsibility, may be more familiar with socially responsible investment options. Such a manager may choose to over-invest in socially responsible stocks, or invest indiscriminately in such stocks despite unattractive risk-return characteristics. With less exposure to socially responsible companies in his personal life, the hypocrite manager will not be exposed to the same familiarity bias and therefore may outperform on a relative basis.

We further hypothesize two possible specific channels through which our hypotheses may affect investment performance. First, authentic managers may have a different (presumably higher) level of their portfolio allocated to socially responsible stocks, compared to hypocrite managers. Depending on whether socially responsible stocks as a whole outperform or underperform other stocks, differences in allocation may explain performance differences at the fund level. Second, authentic managers may have a different level of skill (higher in the case of H1, lower in the case of H2) in picking socially responsible stocks, compared to hypocrite managers. If so, the socially responsible stocks owned by authentic SRIs will out-perform or under-perform those owned by their hypocrite peers.

Testing our hypotheses on the data, we find no statistical difference between socially responsible and regular mutual funds. Among socially responsible mutual funds, we find that authentic SRMF managers significantly outperform hypocrite SRMF managers (monthly returns are 24 bps higher, and monthly Carhart (1997) four factor

alphas are 13 bps higher). No such outperformance exists when comparing hybrid and electric car buyers to normal car buyers among regular (i.e. not classified as socially conscious) mutual fund managers. Furthermore, we find that authentic and hypocrite socially responsible fund managers hold very similar fractions of their portfolio in environmentally-conscious stocks as measured using KLD environmental scores (both hold about 54% of the portfolios in environmentally-conscious stocks). However, the performance of environmentally conscious stocks in authentic managers' portfolios is significantly higher than environmentally conscious stocks in hypocrite managers' portfolios (monthly outperformance of 27 bps). This outperformance explains much of the outperformance observed for authentic SRMFs compared to hypocrite SRMFs.⁴

All of these findings are consistent with our first hypothesis: that authentic SRMFs outperform as a result of familiarity with product markets of companies they've been tasked to invest in. Aside from immediate policy implications suggesting investors in socially responsible mutual funds choose managers who are also personally socially responsible consumers, the broader finance question explored in our paper relates to whether consumption of a good is related to better investment choices pertaining to that good (either through consumption generating familiarity or because consumption reflects dedication to the cause). Peter Lynch's famous advice of "invest in what you know" seems to ring true even for knowledge obtained or reflected in consumption in product markets.⁵

⁴ 27 bps outperformance on 54% of the portfolio leads to roughly a 15 bps outperformance, which accounts for about 60% of the increased returns observed for such funds.

⁵ Recent comments from Peter Lynch suggest that "his ideas are being misquoted widely... "I've never said, "If you go to a mall, see a Starbucks and say it's good coffee, you should call Fidelity brokerage and buy the stock," Lynch says, some 25 years after his retirement from running Magellan Fund was front-page news." (See "Peter Lynch, 25 years later: it's not just 'invest in what you know'", MarketWatch

The remainder of this paper describes the data used in the study, presents our empirical findings, discusses and rules out several alternative explanations for our findings, and, finally, concludes.

Data

Our project uses four main data sources: mutual fund data including manager names and socially responsible classification from Morningstar Direct; mutual fund characteristics, security holdings, and fund performance from CRSP; stock level environmental, social, and governance ratings from KLD Research & Analytics; and vehicle purchase data from VIN.place. From these four sources, we build a unique dataset of open-end mutual funds with which to test the hypotheses described above.

VIN.place has new car purchase data, searchable by first and last name, compiled from dealerships and auto insurance companies for vehicle purchases across the United States, and includes such information as the make, model, and year of the vehicle and the city and state of purchase. Through the data contained in the VIN number, this dataset also provides vehicle characteristics, such as the EPA reported city and highway mileage, the type of engine in the vehicle, and the trim level.⁶

We search for all actively managed equity mutual fund managers in our sample on VIN.place using a name search. In order for a vehicle purchase record to be matched to a given mutual fund manager, we require that the first and last name of the purchaser match the manager name provided by Morningstar, and that the state of the

December 28th 2015). Peter Lynch further adds that “popular-wisdom version of his ideology...leaves out the role of serious fundamental stock research.” Presumably, professional fund managers would not be susceptible to this oversight.

⁶ Brown, Lu, Ray, and Teo (2017) also use data from VIN.place, utilizing vehicle performance characteristics to identify the risk tolerance of hedge fund managers.

vehicle's purchase matches the location of the mutual fund.⁷ We use car purchases of fund managers to compute a measure of how “green” a fund manager is. In order to aggregate this vehicle data at a share-class level, we perform the following process.⁸ First, we restrict vehicle purchases to those made either before or during a manager's tenure at a fund. Then, we assign each vehicle purchase an “effective date”, which is latter of either the vehicle's purchase date or the manager's start date.

This allows us to create a monthly time series of vehicle purchases. We identify a running metric of the “green”ness of a fund by tallying the proportion of vehicles that are environmentally friendly in each month. “Green” vehicles are defined as cars with either hybrid or electric engines.⁹ For our empirical tests, this monthly metric is converted to a binary variable that displays if the fund-level greenness is above the median greenness across the sample in that month.

Summary statistics for our data are presented separately for socially conscious and non-socially conscious funds in Table 2-1.¹⁰ Unsurprisingly, socially conscious

⁷ We also trim the number of cars owned by managers at the 95th percentile to eliminate data errors and common first name-last name combinations. For instance, the name “Michael Smith” is mapped to 10 distinct car purchases in our sample, even after restricting matches to the location of the mutual fund. However, it is unlikely that all of these purchases of new cars are made by the mutual fund manager we are interested in. In these cases, we exclude the observation. As a result of this decision, the maximum number of cars tied to a given manager in our vehicle purchase sample is six.

⁸ Note that the majority of our analyses take place at the share class level, rather than the fund-level. Most importantly, this is driven by different manager tenure across various share classes, even within the same fund. Our results are directionally consistent if we aggregate to the fund-level, though statistical significance is generally reduced from a reduction in sample observations. In our regression analyses, we also cluster at the fund level to account for correlation across share classes.

⁹ In unreported robustness tests, we also conduct our analyses using the average highway mileage of vehicles attributed to the fund in a given month. The results are qualitatively similar.

¹⁰ Morningstar provides a binary variable, “socially conscious”, defined as indicating “if the fund selectively invests based on certain non-economic principles. Such funds may make investments based on such issues as environmental responsibility, human rights, or religious views. A socially conscious fund may take a pro-active stance by selectively investing in, for example, environmentally-friendly companies, or

funds have a larger fraction of green cars among managers. Additionally, they are significantly larger, and thus have more managers and more cars associated with the fund. Thus, we control for size, number of managers, and number of cars in all of our analyses.

For our holdings-level analysis, we also need measures of the social responsibility of individual securities held in fund portfolios. For this, we use KLD Research & Analytics, which was acquired by MSCI in 2010. The KLD dataset provides indicator variables on a variety of environmental, social, and governance metrics (ESG) at an annual frequency. Their metrics can be summed into seven distinct categories: corporate governance, community, diversity, employee relations, environmental indicators, human rights concerns, and product metrics. We use these measures to classify holdings when analyzing sources of out- and underperformance later in our analysis.

Results

Fund Performance Results

To motivate our study, we first construct a 2x2 matrix, separating funds based upon whether they are socially conscious along the vertical axis and whether fund managers have socially responsible personal consumption habits on the horizontal axis. We proxy for socially responsible personal consumption habits using car purchases, and classify funds with above median levels of green car ownership among their management as having socially responsible personal consumption habits. Table 2-2

firms with good employee relations. This group also includes funds that avoid investing in companies involved in promoting alcohol, tobacco, or gambling, or in the defense industry.”

presents average monthly returns for all share classes in each cell of this 2x2 matrix, along with differences and differences-in-differences. We can see that while personal consumption habits don't affect returns among regular mutual funds (both have monthly average returns of about 66 to 67 bps), authentic managers significantly outperform hypocrite managers by 31 bps a month. Additionally, this difference is significantly different from the corresponding difference across regular mutual fund managers.

Of course, this is without controlling for any fund characteristics or other pertinent variables. Additionally, this analysis uses raw returns, which do not control for systematic risk exposures of the funds. To address these issues, we use a multivariate regression analysis. The results of this analysis are presented in Table 2-3. We present two specifications: the first includes fund age as a control, while the second includes year fixed effects as controls. The key explanatory variables, which mirror our 2x2 motivating analysis earlier, are a dummy variable indicating a socially conscious fund (SCon), a dummy variable indicating above median levels of manager green car ownership (Green Engine), and an interaction of these two variables. The coefficient on the interaction term captures the difference in performance between authentic and hypocrite funds, compared to the difference between green car driving regular funds and non-green car driving regular funds. We can see that this difference-in-differences is significant and indicates that authentic managers outperform hypocrite managers by 24 bps per month in terms of raw returns and 13 bps per month in terms of alphas.

These findings are consistent with our first hypothesis that socially responsible managers who have socially responsible personal consumption habits outperform due

their familiarity with their investments' product markets. We further explore our hypotheses by examining the funds' holdings.

Holdings Analysis

We begin our analysis of holdings by repeating the 2x2 matrix used earlier, but examining the weight in environmentally conscious holdings in each cell. In particular, we utilize the KLD dataset to create a score for each stock in each year as the proportion of positive environmental indicators minus the proportion of negative environmental indicators. Firms lying in the top tercile of this score distribution are assigned an environmental rank of 1 and 0 otherwise. Using holdings data from CRSP, we compute the percentage of portfolio held in environmental and non-environmental securities, respectively. The results of our 2x2 portfolio weights analysis are presented in Table 2-4. We see that among regular funds, those with above median levels of green car ownership invest a significantly higher proportion of their portfolio in environmentally conscious stocks (49.4% vs 43.6%). Among socially conscious funds, those with above median levels of green car ownership also invest statistically significantly more in environmentally conscious stocks (54.7% vs 53.1%), but the magnitude of the difference is much smaller. Thus, it does not appear that authentic funds invest more in environmentally conscious holdings than their hypocrite peers, compared the control group of regular fund managers.

When we look at the average returns from environmentally conscious holdings and non-environmentally conscious holdings, we do see that environmentally conscious stocks significantly underperform. In untabulated results, we find that the monthly average return on a value-weighted portfolio of environmentally conscious stocks is 1.06%, compared 1.39% for a value-weighted portfolio of non-environmentally

conscious stocks (significantly different at the 5% level). Thus, the increased environmentally conscious holdings for regular (socially conscious) funds translates into underperformance of 1.9 bps (0.5 bps) for these funds on account of a base level of underperformance of environmentally conscious holdings. We do not find economically significant evidence of our second hypothesis, that authentic managers overinvest in environmentally conscious holdings. If anything, this hypothesis is more likely to hold true for regular fund managers with socially conscious personal consumption habits.

In addition to different levels of environmentally conscious holdings, our first and second hypotheses also have competing predictions on how authentic and hypocrite managers will perform on the security selection of environmentally conscious holdings. In the case of H1, authentic managers will be able to select better than average environmentally conscious holdings than their hypocrite peers as they know the product market in this space better. In the case of H2, it would be the opposite as authentic managers would choose their environmentally conscious holdings indiscriminately.

We test these hypotheses on the data by performing our usual bivariate sort, and analyzing the category excess return in each cell for environmentally conscious and non-environmentally conscious holdings separately. Table 2-5, Panel A presents these results. We can see that the effect of driving green cars is markedly different for socially conscious and non-socially conscious funds. In the case of socially conscious funds, authentic managers exhibit significantly better security selection than their hypocrite counterparts (average excess return over environmentally conscious holding benchmark of 17.2 bps per month versus 0.2 bps a month, significant at the 5% level). However, in the case of regular fund managers, the opposite is true. Green car drivers

underperform on their environmentally conscious holdings (average excess return over environmentally conscious holding benchmark of 11.3 bps per month versus 18.5 bps a month, significant at the 1% level).¹¹ Security selection for non-environmentally conscious holdings do not exhibit any discernable patterns (see Table 2-5, Panel B). This supports H1 for authentic socially conscious fund managers. The results, like those analyzing allocations, also support H2 in the case of regular fund managers who buy green cars.

We repeat this analysis in a multivariate setting in Table 2-6, Panel A. Again, the coefficient on the interaction term of the socially conscious and green car dummy captures the difference-in-differences of security selection skills across authentic and hypocrite managers versus regular fund managers with and without socially responsible personal consumption habits. The analysis shows that improved security selection yields about 27 bps of outperformance on a monthly level in environmentally conscious holdings. There is no outperformance on non-environmentally conscious holdings.

These results support our first hypothesis: authentic managers outperform because they are better at selecting environmentally conscious stocks. Again, we find suggestive, directional support for the second hypothesis in the case of regular fund managers who have socially conscious personal consumption habits (the coefficient on the Green Engine dummy for environmental stocks is directionally negative, although not statistically significant at the traditional levels).

¹¹ We note that this analysis shows positive average excess returns for all the cells, and the overall average across funds, despite the excess returns themselves being mean zero numbers. This is because we are averaging across funds, regardless of assets under management. Conducting the same exercise weighting by assets under management yields similar conclusions, and is consistent with mean zero excess returns. An investor in these funds would find the first analysis more useful in picking funds with better performance.

Robustness Tests & Alternative Explanations

As a placebo test to our holdings analysis, we also re-run the analysis for stocks that are considered socially responsible on the entire spectrum of KLD metrics. Using KLD Analytics, we construct an overall firm-year score based on the seven dimensions present in the KLD dataset: corporate governance, community, diversity, employees, environment, human rights, and products. In this placebo test, firm-years are assigned a rank of 1 if they fall in the top tercile of firms in a given year when considering all KLD dimensions and assigned a rank of 0 otherwise. We repeat the analysis of Table 2-6, Panel A, with this measure of socially conscious holdings in Table 2-6, Panel B. We do not find any significant effects of fund managers' personal consumption habits. This further supports our first hypothesis. Knowledge gleaned about product markets from driving a green car is most likely applicable in choosing environmentally conscious stocks, rather than stocks that are "good" across a spectrum of metrics.

We also perform a multivariate version of the portfolio weights analysis shown in Table 2-4. These results are shown in Table 2-7, column (1). In the multivariate setting, we see that operating a socially conscious fund or driving an environmentally-friendly car are both related to an increase in the proportion of environmental holdings, but the difference-in-differences effect is insignificant. This supports our earlier conclusion that the improved performance of authentic managers is not due to differences in asset allocation, but instead largely attributable to increased skill in security selection.

Finally, we also consider two alternate explanations. First, perhaps fund managers who drive green cars simply charge lower fees to manage socially conscious funds. They are "passionate about the cause," and are willing to accept lower incomes

to help others invest in socially conscious stocks. This, in turn, may drive the relative outperformance of these funds. While this would not explain the better stock selection skills among environmental stocks that we observe above, we explore this possibility by analyzing whether authentic managers charge lower expense ratios than hypocrite managers. This analysis is presented in Table 2-7, column (2). We find no evidence of this alternative explanation. If anything, authentic managers charge more than their hypocrite peers. Thus, this explanation is unlikely to be driving our results.

Another explanation is that perhaps managers' personal consumption habits are monitored by mutual fund investors and flows are higher for authentic managers. These higher flows, may in turn allow for more flexibility in deploying capital and lead to outperformance. Again, while this would not explain the better stock selection skills we observed above, we explore this explanation by analyzing whether authentic managers have higher inflows than hypocrite managers. This analysis is presented in Table 2-7, column (3). We find no evidence of this alternative explanation.

Chapter 2 Concluding Remarks

Our study is the first showing that personal consumption habits are associated with improved investment performance. For a sample of socially responsible mutual fund managers, we show that managers with socially responsible personal consumption habits outperform those without socially responsible personal consumption habits. We further show that this outperformance is largely driven by better security selection among environmentally conscious stock holdings. We interpret these findings as supporting the hypothesis that managers with environmentally conscious personal consumption habits know more about product markets for companies in that space, and thus, are better able to invest in that space. It is also consistent with a world in which

authentic managers who display an increased dedication to their fund's objective, as proxied by their personal consumption habits, exert additional effort and outperform relative to their hypocrite peers.

In addition to documenting a novel source of gleaning investment expertise and providing empirical support for Peter Lynch's adage to "invest in what you know," our study also provides a channel to document how alignment between employee and corporate culture improves firm performance (see, for example, Graham, Harvey, Popadak, and Rajgopal, 2017). The Harvard Business Review suggests that "good cultural fit is associated with many ... positive outcomes ... A 2005 meta-analysis by Kristof-Brown [see Kristof-Brown, Zimmerman, and Johnson, 2005] reported that employees who fit well with their organization ... showed superior job performance."¹² One channel through which this may arise is greater knowledge of product markets in which the firm operates arising from closer alignment between personal consumption choices and firm's relevant product markets.

¹² See "Recruiting for Cultural Fit," by Katie Bouton, Harvard Business Review, July 17, 2015.

Table 2-1. Summary Statistics.

	SCon = 0 (N = 7,904)		SCon = 1 (N = 146)		Difference	
	Mean	Std. Dev.	Mean	Std. Dev.		
<u>Fund characteristics</u>						
Expense Ratio (%)	1.23	0.63	1.15	0.57	-0.08	
Turnover Ratio (%)	101.04	318.63	44.10	32.27	-56.95	**
Retail Fund (%)	55.07	49.75	54.11	50.00	-0.96	
Year of Inception	2004	8.34	2003	8.66	-0.66	
<u>Panel data</u>						
Total Net Assets (\$M)	460.96	2,218.75	874.86	4,645.90	413.90	***
Monthly Net Flow (%)	9.24	1,845.38	3.46	278.01	-5.78	***
Number of Vehicles	3.23	3.08	4.35	3.20	1.12	***
Number of Managers	2.41	1.96	3.26	1.78	0.85	***
Green Engine	0.09	0.28	0.16	0.37	0.08	***

This table presents summary statistics for the full sample. Financial information comes from the Center for Research in Security Prices (CRSP) Survivorship-Free Mutual Fund Database, manager history and measures of socially conscious are provided by Morningstar, and vehicle data is collected from VIN.place. Summary statistics are presented separately for funds classified as socially conscious and those not classified as socially conscious by Morningstar. The number of vehicles is the total number of vehicles on which we have data for each fund. Green engine is a dummy variable indicating if the fraction of green cars a fund's managers drive is above the sample median, where green cars are defined as hybrids and electric cars. Means and standard deviations across funds (fund-months) are presented for fund characteristics (fund time series data), along with differences. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-2. Bivariate Performance Sort.

		Green Engine		Total	Difference (P-Value)	
		0	1			
Socially Conscious	0	Mean	0.663	0.667	0.663	0.003
		Std. Error	0.007	0.021	0.007	(0.892)
	1	Mean	0.547	0.858	0.598	0.311**
		Std. Error	0.051	0.092	0.045	(0.010)
Total	Mean	0.661	0.674	0.662	0.013	
	Std. Error	0.007	0.020	0.007	(0.583)	
Difference		-0.116**	0.192*	-0.065	0.307	
P-Value		(0.026)	(0.067)	(0.167)	(0.016)**	

This table presents bivariate performance sorts, where the vertical axis splits the sample based on the whether a fund is categorized as socially conscious by Morningstar, and the horizontal axis separates based upon the green engine measure being above or below the median green engine measure. Average returns, standard errors, differences, and difference-in-differences are presented, along with p-values. Statistical significance for all differences are indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-3. Fund Performance Regressions.

	Monthly Return		Four-Factor Alpha	
	(1)	(2)	(3)	(4)
Socially Conscious	-0.145 *	-0.059	-0.007	-0.008
	-1.881	-0.774	-0.232	-0.261
Green Engine	-0.101 ***	-0.017	-0.021	-0.016
	-2.744	-0.540	-1.065	-0.874
SCon x Green Engine	0.418 ***	0.239 **	0.106 *	0.127 **
	4.023	2.093	1.846	2.234
Number of Cars	0.026 ***	0.014 ***	-0.019 ***	0.003
	4.579	3.134	-6.349	1.236
Number of Managers	-0.037 ***	-0.027 ***	0.024 ***	-0.006
	-4.002	-3.589	5.383	-1.392
Fund Age	0.007 ***		0.000	
	8.818		0.723	
Fund level controls	Yes	Yes	Yes	Yes
Lagged performance, Flows and Size	Yes	Yes	Yes	Yes
Fixed Effects	Obj. & State	Obj/State/Year	Obj. & State	Obj/State/Year
Observations	429,608	429,608	429,608	429,608
Adj. R-Squared	0.0326	0.1054	0.0134	0.0218

This table presents multivariate regressions of fund performance. The variable of interest is the interaction term between socially conscious and green engine, which captures the difference-in-differences effect. In columns (1) and (2), the dependent variable is the unadjusted monthly return, while columns (3) and (4) use the four-factor alpha, following Carhart (1997). Socially Conscious is a dummy variable that indicates whether a mutual fund is socially conscious. Green Engine is a dummy variable that denotes whether the fund has a higher proportion of electric or hybrid vehicles than the median fund in that month. SCon x Green Engine is an interaction of the previous two dummies. Fund level controls include expense ratio, turnover ratio, and a dummy indicating retail funds. Standard errors are clustered at the portfolio level and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-4. Bivariate Holdings Weights.

			Green Engine		Total	Difference (P-Value)
			0	1		
Socially Conscious	0	Mean	43.551	49.401	44.052	5.850
		Std. Error	0.046	0.145	0.044	(0.000)***
	1	Mean	53.127	54.652	53.364	1.525
		Std. Error	0.289	0.871	0.279	(0.048)**
Total	Mean		43.754	49.615	44.266	5.861
	Std. Error		0.045	0.144	0.043	(0.000)***
	Difference		9.576	5.251	9.312	-4.325
	P-Value		(0.000)***	(0.000)***	(0.000)***	(0.000)***

This table presents bivariate sorts of fund allocation weights, where the weight is the market value weight across all holdings present in both CRSP and the KLD Analytics databases. In this table, the vertical axis splits the sample based on the measure of socially conscious provided by Morningstar, and the horizontal axis separates based upon the green engine measure. We compare the weight in environmental holdings (EnvScore = 1, defined as holdings where the KLD Analytics environmental scores are in the top tercile, computed yearly) for each of the cells. Statistical significance of differences is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-5. Bivariate Holdings Performance.

Panel A: Environmental Score = 1

		Green Engine		Total	Difference (P-Value)	
		0	1			
Socially Conscious	0	Mean	0.185	0.113	0.179	-0.072
		Std. Error	0.007	0.021	0.006	(0.002)***
	1	Mean	0.002	0.172	0.029	0.169
		Std. Error	0.028	0.073	0.027	(0.021)**
Total	Mean	0.181	0.116	0.176	-0.066	
	Std. Error	0.007	0.021	0.006	(0.003)***	
		Difference	-0.183	0.058	-0.150	0.241
		P-Value	(0.000)***	(0.575)	(0.000)***	(0.037)**

Panel B: Environmental Score = 0

		Green Engine		Total	Difference (P-Value)	
		0	1			
Socially Conscious	0	Mean	0.055	0.046	0.054	-0.009
		Std. Error	0.005	0.014	0.005	(0.620)
	1	Mean	-0.147	-0.211	-0.157	-0.064
		Std. Error	0.027	0.050	0.024	(0.337)
Total	Mean	0.051	0.036	0.050	-0.015	
	Std. Error	0.005	0.014	0.005	(0.382)	
		Difference	-0.202	-0.257	-0.211	-0.056
		P-Value	(0.000)***	(0.000)***	(0.000)***	(0.534)

This table presents bivariate performance sorts, where performance is measured as the value-weighted performance of a fund's holdings in a given environmental category minus the value-weighted benchmark in the corresponding KLD rank category. In this table, the vertical axis splits the sample based on the measure of socially conscious provided by Morningstar, and the horizontal axis separates based upon the green engine measure. In Panel A, performance is compared for holdings with an environmental rank of 1, which consists of firm-years in the top tercile of environmental metrics. In Panel B, performance is compared for holdings with an environmental rank of 0, which consists of firm-years in the bottom two terciles of environmental metrics. Statistical significance of differences is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-6. Holdings Based Return Regressions.
Panel A: Environmental KLD ranking categorization

	Environmental = 0		Environmental = 1	
	(1)	(2)	(3)	(4)
Socially Conscious	-0.183 **	-0.164 **	-0.177 ***	-0.143 ***
	-2.282	-2.161	-3.423	-2.815
Green Engine	0.023	0.002	-0.066 *	-0.052
	0.370	0.047	-1.668	-1.296
SCon x Green Engine	-0.042	0.014	0.267 **	0.274 *
	-0.364	0.140	2.456	1.801
Number of Cars	-0.018 **	-0.009	-0.016 **	-0.010
	-2.001	-1.104	-2.484	-1.637
Number of Managers	0.027	0.012	0.029 ***	0.012
	1.524	0.697	3.016	1.286
Fund Age	0.001	0.002 *	0.000	0.002 *
	0.623	1.847	-0.387	1.777
Fund level Controls	Yes	Yes	Yes	Yes
Lagged Performance, Flows, and Size	Yes	Yes	Yes	Yes
Fixed Effects	---	Obj. & State	---	Obj. & State
Observations	313,596	313,596	310,160	310,160
Adj. R-Squared	0.0006	0.0124	0.0006	0.0101

These tables present multivariate regressions on the value-weighted excess performance of funds. Rather than using reported returns from CRSP, which are net of expenses, this measure is constructed from reported fund holdings. Using KLD Analytics, we construct a firm-year score on each of the seven dimensions present in the KLD dataset: corporate governance, community, diversity, employees, environment, human rights, and products. Holding firm-years are assigned a rank of 1 if they fall in the top tercile of firms in a given year and assigned a rank of 0 otherwise. In Panel A, we examine the performance of funds based upon the environmental classification of their holdings. In Panel B, we use all seven categories to construct an overall classification of securities held in portfolio. The measure of excess performance is calculated as the value-weighted return of holdings in a given type minus the value-weighted return of all available stocks in the same corresponding KLD category. Socially Conscious is a dummy variable that indicates whether a mutual fund is socially conscious. Green Engine is a dummy variable that denotes whether the fund has a higher proportion of electric or hybrid vehicles than the median fund in that month. SCon x Green Engine is an interaction of the previous two dummies. Fund level controls include expense ratio, turnover ratio, and a dummy indicating retail funds. Standard errors are clustered at the portfolio level and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-6. Continued.

Panel B: Overall KLD ranking categorization

	Overall = 0		Overall = 1	
	(1)	(2)	(3)	(4)
Socially Conscious	-0.253 ***	-0.219 ***	-0.164 ***	-0.127 **
	-3.589	-3.626	-2.861	-2.309
Green Engine	-0.056	-0.053	0.013	0.005
	-0.868	-0.943	0.285	0.129
SCon x Green Engine	0.074	0.109	0.137	0.157
	0.641	1.110	1.146	1.146
Number of Cars	-0.014 *	-0.008	-0.005	0.005
	-1.692	-0.943	-0.714	0.692
Number of Managers	0.020	0.008	0.009	-0.010
	1.131	0.461	0.918	-1.091
Fund Age	0.000	0.002 *	0.000	0.002 **
	0.457	1.660	0.276	2.466
Fund-level Controls	Yes	Yes	Yes	Yes
Lagged Performance, Flows, and Size	Yes	Yes	Yes	Yes
Fixed Effects	---	Obj. & State	---	Obj. & State
Observations	312,428	312,428	312,348	312,348
Adj. R-Squared	0.0006	0.0110	0.0006	0.0110

These tables present multivariate regressions on the value-weighted excess performance of funds. Rather than using reported returns from CRSP, which are net of expenses, this measure is constructed from reported fund holdings. Using KLD Analytics, we construct a firm-year score on each of the seven dimensions present in the KLD dataset: corporate governance, community, diversity, employees, environment, human rights, and products. Holding firm-years are assigned a rank of 1 if they fall in the top tercile of firms in a given year and assigned a rank of 0 otherwise. In Panel A, we examine the performance of funds based upon the environmental classification of their holdings. In Panel B, we use all seven categories to construct an overall classification of securities held in portfolio. The measure of excess performance is calculated as the value-weighted return of holdings in a given type minus the value-weighted return of all available stocks in the same corresponding KLD category. Socially Conscious is a dummy variable that indicates whether a mutual fund is socially conscious. Green Engine is a dummy variable that denotes whether the fund has a higher proportion of electric or hybrid vehicles than the median fund in that month. SCon x Green Engine is an interaction of the previous two dummies. Fund level controls include expense ratio, turnover ratio, and a dummy indicating retail funds. Standard errors are clustered at the portfolio level and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

Table 2-7. Robustness and Alternative Explanations.

	(1) Weight, Env = 1	(2) Expense Ratio	(3) Percentage Flow
Socially Conscious	4.079 *	-0.132 ***	-7.300
	1.708	-2.991	-1.269
Green Engine	2.589 *	-0.089 ***	-13.488 **
	1.824	-3.308	-2.304
SCon x Green Engine	-3.531	0.333 *	0.043
	-0.361	1.924	0.005
Fixed Effects	Obj. & State	Obj. & State	Obj. & State
Controls	Yes	Yes	Yes
Observations	332,266	332,266	332,266
Adj. R-Squared	0.4945	0.1230	-0.0001

This table attempts to rule out alternate explanations. In column (1), the dependent variable is the weight in environmental holdings, classified as stocks with an environmental score from KLD Analytics in the top tercile in a given year. In columns (2) and (3), the dependent variable is the expense ratio and the monthly net flow percentage, respectively. Socially Conscious is a dummy variable that indicates whether a mutual fund is socially conscious. Green Engine is a dummy variable that denotes whether the fund has a higher proportion of electric or hybrid vehicles than the median fund in that month. SCon x Green Engine is an interaction of the previous two dummies. Standard errors are clustered at the portfolio level and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels.

CHAPTER 3
I CAN SEE CLEARLY NOW: SALIENCE AND THE IMPACT OF DISCLOSURE
REQUIREMENTS ON RETIREMENT PLAN FEES

Motivation

In a world of complex financial products, consumers often rely upon the services of financial intermediaries such as brokers, financial advisors, and record keepers. While these intermediaries are occasionally paid in the form of direct fees, it is also common that they receive indirect payments in the form of contingent commissions or rebates paid by firms offering investment products. Indirect compensation raises obvious concerns about conflicts of interest, since indirect payments may lead intermediaries to select service providers based on the size of the commissions paid rather than on the quality of service provided or the overall cost to consumers. One potential way to mitigate such conflicts of interest is to require that intermediaries disclose the compensation that they receive from product providers. However, as Inderst and Ottaviani (2012a and 2012b) show, if some consumers are naïve or compensation disclosures are not sufficiently salient, then intermediaries may use indirect compensation as a form of price discrimination. Price discrimination leads to sophisticated or so called wary consumers relying more on direct advisory fees and naïve consumers (i.e. consumers who do not form rational expectations concerning the incentives indirect payments create) paying for financial services through greater reliance on indirect advisor compensation.

Revenue sharing is a widely used way of indirectly compensating advisors to employer sponsored defined contribution (DC) retirement plans.¹ Revenue sharing

¹ Under Title I of the Employee Retirement Income Security Act of 1974 (ERISA), employers are permitted to sponsor either defined benefit or defined contribution plans. The Department of Labor (DOL)

typically involves mutual funds or other investment fund providers sharing some of the fees they charge plan participants with the plan record keeper/advisor. In this paper, we examine the impact of revenue sharing on the level and structure of administrative fees paid by 401(k) plans. We argue that when revenue sharing is not salient, the practice provides a way for advisors and mutual fund providers to price discriminate between wary and naïve plan sponsors.²

We examine the importance of salient fee disclosure empirically by examining changes in the level and structure of compensation paid to service providers around regulatory changes designed to increase the salience of disclosures concerning indirect compensation. Specifically, since 2009 plan sponsors have been required (with certain exceptions discussed later) to disclose to the Department of Labor (but not to plan participants) the amount of indirect and direct compensation paid. Survey evidence suggests that despite these disclosure requirements, many plan sponsors were unaware of revenue sharing agreements.³ However, beginning in 2012, service providers were required to disclose to plan sponsors the annual amount of direct and indirect compensation they expect to earn from their contract. To make these disclosures “eye opening”, plan sponsors were required to use the disclosed information

is responsible for regulatory oversight of ERISA retirement plans. Over the past three decades, employers have shifted away from defined benefit and towards defined contribution plans. See GAO (2012).

² The argument is similar to one proposed by Stango and Zinman (2011), in which lenders shroud interest rates and market low monthly payments to price discriminate on consumer payment/interest bias.

³ According to a survey conducted by the Government Accountability Office (GAO), 48% of plan sponsors did not know if their service provider had a revenue sharing agreement with another service provider. Thirty-four percent of plan sponsors surveyed indicated they did not have revenue sharing agreements. However, further analysis of plan documents indicated more than half of those who believed that their plan did not contain revenue sharing agreements did in fact have revenue sharing agreements. See GAO (2011).

in their evaluation of the reasonableness of service provider fees and were required to disclose to plan participants the direct and indirect compensation paid out of plan assets to service providers.⁴ In this paper, we examine the impact of these disclosure requirements on fees paid by plans to third-party service providers. Specifically, since we are able to observe direct and indirect fees paid both before and after regulatory changes that affect the salience of indirect fees, we can examine the impact of disclosure salience on the structure and level of fees.

Our empirical analysis consists of three parts. In the first part, we use data on direct and indirect fees paid to third party service providers reported on Schedule C of Form 5500 filed by plan sponsors annually with the Department of Labor (DOL). Our sample consists of 39,519 401(k) plans that filed Form 5500 from 2010 through 2014.⁵ Using these data, we examine changes in the level of direct and indirect compensation around the 2012 regulatory changes. We use plan size as a measure of the likelihood that the plan sponsor is wary or naïve, based on an assumption that sponsors of larger plans are likely to be more sophisticated and therefore more wary of the incentive conflicts indirect compensation may create.

Overall, we find a dramatic shift away from indirect compensation and toward direct compensation across all plan sizes after 2012. Specifically, we document that total indirect compensation relative to plan assets declined by 3.3 basis points after 2012, which represents a reduction of about 36% relative to the sample mean, while

⁴ See Department of Labor Fact Sheets at: <https://www.dol.gov/sites/default/files/ebsa/about-ebsa/our-activities/resource-center/fact-sheets/final-regulation-service-provider-disclosures-under-408b2.pdf> and <https://www.dol.gov/agencies/ebsa/employers-and-advisers/guidance/field-assistance-bulletins/2012-02>.

⁵ As discussed below, reporting of indirect compensation on Schedule C began in 2009, but was not fully implemented until 2010.

direct compensation relative to plan assets increased by 1.1 basis points, representing an increase of about 5% relative to the sample mean. Accordingly, we also find a decrease in the proportion of indirect compensation to total compensation. Consistent with revenue sharing enhancing the ability of plan advisors and mutual funds to price discriminate, we find a significant decrease in the overall compensation of service providers only for small plans with arguably less sophisticated sponsors. For large plans, we find that reductions in indirect compensation are offset on average dollar for dollar by increases in direct expenses. Our findings are robust to controlling for plan fixed effects to address concerns regarding unobservable differences between plans.

While our results based on plan level compensation are consistent with the argument that salient disclosures reduce price discrimination, the short time series of compensation data available from the DOL makes it difficult to control for potential confounding factors that may affect service provider compensation. In the second part of our analysis, we address this concern by examining the shift in investor demand for low cost mutual funds around the 2012 regulatory changes. Specifically, we analyze the movement of fund flows into low-cost share classes and the introduction of low-cost share classes targeting 401(k) retirement plans. We base this analysis on a large sample of mutual funds from the monthly CRSP mutual fund database between 2003 and 2016.

Our second analysis is motivated by the fact that a common form of revenue sharing involves mutual fund providers on a plan's menu charging 12b-1 and/or load fees and then rebating some or all of these fees back to the record keeper/plan

advisor.⁶ If changes in disclosure requirements caused a substitution of direct for indirect compensation, then we would expect an increase in demand for retirement fund share classes (institutional share classes and so called R share classes) with lower 12b-1 fees and loads and an increase in the flow of funds into lower cost share classes after 2012.⁷ By introducing a new lower cost retirement share class, a fund which is on a plan menu can remain on the menu while satisfying the plan sponsor's demand for less revenue sharing and more transparent compensation arrangements. The advantage of this strategy for identifying the impact of regulation is that we can use a longer time series of share class introductions and flows (from 2003 through 2016) to compare retirement share class creations and flows to retail share class creations and flows. The longer time series (relative to the time series of Schedule C data) also allows us to conduct placebo tests to identify whether 2012 is the year in which a structural break occurs.⁸

Overall, we find a significant increase in the likelihood of funds introducing low cost retirement share classes after 2012 (i.e. share classes with lower 12b-1 fees). In the case of retail funds, we find just the opposite – a reduction in the likelihood of low cost share class creation. Controlling for fund performance and other factors, we also find a significant decrease in flows into retirement fund share classes with high 12b-1 fees after 2012 but an increase the flows into retail funds with high 12b-1 fees. In

⁶ The idea is that the record keeper provides services to plan participants that the mutual fund and or the broker distributing the fund would otherwise have to provide to individual investors.

⁷ For discussion of revenue sharing arrangements involving 12b-1 fees and load fees in 401(k) plans, see ICI Research Perspective (2016).

⁸ We use the placebo test described in Miller (2009).

general, the evidence indicates an increase in the availability and flow of funds into share classes with lower revenue sharing after 2012.

The final part of our analysis involves examining changes in the mutual fund investment options on plan menus and the mean expense ratio of mutual funds on plan menus. For this analysis, we hand-collect information on mutual funds offered on plan menus from Schedule H of the Form 5500 for a random sample of 300 individual plans from 2010 through 2014.⁹ The results based on this hand-collected sample of plan-level options are consistent with our findings on direct and indirect compensation, as well as with our findings on the macro-level demand for mutual funds that are less likely to engage in revenue sharing. Specifically, we find that the average number of low cost mutual funds on plan menus significantly increases after 2012. Moreover, we document that the average expense ratio of mutual funds offered by plans significantly declines by about 9 basis points after 2012 which is a decrease of about 11% relative to the sample mean.

Our study contributes to several strands of the literature, including the effects of salience, the pricing of financial services, and the potential incentive conflicts that may arise between 401(k) service providers and plan participants. First, previous empirical studies on the impact of salience have focused primarily on how the salience of taxes affects consumer choice. For example, Finkelstein (2009) finds that how highway tolls are collected (i.e., electronically versus cash collection) affects driver awareness of tolls and the elasticity of driving with respect to tolls. Other studies of how taxes are

⁹ While plans may offer other investment options to participants, such as direct stock investments or separated accounts, we focus on mutual funds because we require data on investment management fees which are only publicly available for mutual funds.

collected find that the salience of taxes has a significant effect on how consumers react to tax changes and the amount of taxes paid.¹⁰ These studies argue that salience has an impact because consumers are often biased in that they rely too heavily on information that is prominent while ignoring information that may be of equal or greater importance in decision making but is not as conspicuous. We add to this literature by providing empirical evidence that how fees are assessed affects the costs incurred by retirement plan participants.

Second, we provide evidence consistent with the predictions of theoretical models of competition by Gabaix and Laibson (2006) and Inderst and Ottaviani (2012a and 2012b) when a subset of consumers are not Bayesian (i.e. they are naïve in the sense that they do not update their beliefs about product prices or advisor biases when information about prices or commissions is shrouded). These models predict that naïve consumers will be exploited, with benefits accruing to either sophisticated consumers or to service providers with some monopoly power. While disclosure is one remedy, financial products with a number of complementary services and associated fees make salient disclosures difficult to design. Our results suggest that requiring plan sponsors to assess all indirect and direct fees paid relative to the value of services received and requiring this information be disclosed to plan participants in summary form increases the salience of revenue sharing disclosure.

Third, our paper contributes to the literature on conflicts of interest in the retirement industry. Pool, Sialm, and Stefanescu (2016) find evidence that mutual funds acting as service providers display favoritism toward their own affiliated funds. We

¹⁰ For a summary of this literature, see Schenk (2011).

provide evidence that service providers to smaller plans also benefit by earning higher fees through revenue sharing agreements.

Fourth, and more broadly, our paper contributes to the literature regarding the effectiveness of disclosure requirements on the fees paid by consumers of financial services. Generally, this literature finds that mandatory disclosures have little impact on consumer choice and fees paid.¹¹ We show that disclosure combined with salience (by requiring the service providers to disclose total expected fees paid) leads to a reduction in fees paid for plans with the least sophisticated sponsors.

The remainder of the paper is organized as follows. First, we provide information on the institutional background and disclosure requirements of defined contribution plans and describe the framework for evaluating the effect of revenue sharing on plan expenses. Next, we describe our data sources. The subsequent sections discuss our results and findings: first, by analyzing the impact of disclosure requirements on the compensation to plan service providers; second, by providing evidence that more salient disclosure requirements increased the demand for mutual funds that do not provide service providers with revenue sharing; and third, by analyzing the impact of increased disclosure requirements on the mutual fund menus of retirement plans. Finally, we provide a summary and conclude.

¹¹ For example, disclosure requirements associated with credit cards and mortgages have arguably met with only limited success (see for example Ausubel (1991) and Agarwal et al. (2015)). Similarly, Bertrand and Morse (2011) find limited effects on the behavior of borrowers using payday loans when provided with more disclosure about the cost of payday loans relative to other financing options.

Background and Hypothesis Development

Institutional Background

Employers frequently provide or sponsor defined contribution (DC) retirement plans for their employees (i.e. plan participants). Self-directed 401(k) plans offer participants a menu of investment options to choose from and in addition, might allow participants to select additional investment options through a brokerage window. Plans sponsors typically use third-party service providers for account record keeping and other administrative services provided to plan participants.¹²

Sponsors have a fiduciary duty to plan participants to evaluate the reasonableness of the fees paid to third-party service providers out of plan assets. Sponsors, especially of small plans, often delegate the design and operation of the plan to an intermediary that serves as a bundled service provider. A bundled service provider typically employs or contracts with a number of additional providers to arrange record keeping services, management, participant communication, and financial advice for participants. According to a study by the Investment Company Institute (ICI), bundled service providers are typically affiliated with investment fund providers. In particular, the ICI found that 43.5% of DC plans used insurance companies as record keepers, 35.4% of plans used asset managers, 15.5% used banks or brokerage firms and only 5.8% of plans used standalone record keepers.¹³

¹² For a description of the structure of service provider arrangements and the role of various service providers, see GAO (2012).

¹³ See ICI Research Perspective (2016).

There are two ways in which plan service providers are compensated out of plan assets.¹⁴ The first is direct compensation paid by plan participants either in the form of a fee per dollar of assets in the plan or a combination of an asset based fee plus a fixed fee per participant. The second is indirect compensation in the form of revenue sharing. Revenue sharing arrangements involve service provider expenses being paid (in part or in full) by plan participants through the fees on the investment products offered through the plan. For example, a typical revenue sharing agreement often involves a mutual fund on the plan menu sharing a portion or all of the 12b-1 fees or account servicing fees paid by plan participants who invest in the fund with the bundled service provider. The idea is that a bundled service provider will provide record keeping services (such as tracking individual account contribution and returns) and may provide certain fund holder services that the fund or broker would otherwise directly provide to individual investors.¹⁵ As a result, certain (non-advisory) fund expenses are incurred by the service provider and revenue sharing is a way to reimburse the service provider for these expenses.

Regulatory concern has focused on the potential for indirect compensation to influence the recommendations of bundled service providers concerning which investment options to include on plan menus.¹⁶ Most plans have what is called an open architecture, in which investment options include funds affiliated with the plan

¹⁴ Record keepers may also receive compensation directly from plan sponsors. DOL reporting requirements only apply to compensation paid out of plan assets. As discussed later, our sample consists of plans where service providers are paid by plan participants through direct or indirect fees.

¹⁵ For example, participant investments and withdrawals in a mutual fund may be combined in an omnibus account leading to lower fund expenses. See ICI Research Perspective (2016).

¹⁶ See, for example, Ayres and Curtis (2014) and GAO (2011).

administrator as well as funds offered by unaffiliated asset managers.¹⁷ In response to concerns about incentive conflicts, the Department of Labor (DOL) began in 2009 to require that plan sponsors disclose the amount of both direct compensation actually paid to third party providers and indirect compensation received by third party service providers that was used to offset plan related expenses on Schedule C of Form 5500, filed annually with the DOL.¹⁸ However, because of concerns that the new disclosure requirements under Schedule C might require service providers to significantly change and update their information management systems, the DOL granted a grace period for service providers that were unable to comply with the new disclosure requirements for the 2009 plan year and delayed full implementation of Schedule C disclosure requirements until the 2010 plan year.¹⁹

In 2012, the DOL implemented several regulatory changes designed to increase the transparency and salience of indirect fees to plan sponsors and participants. The first, rule 408(b)(2), requires that plan sponsors receive from third party service providers (referred to as “covered service providers” or CSPs) estimates of the indirect

¹⁷ According to the ICI, in 2013 about 60% of DC assets were invested in mutual funds with the remainder invested in insurance products (such as stable value funds) or in in the case of large plans, collective trusts.

¹⁸ Direct compensation and “non-eligible” indirect compensation is required to be reported to the DOL on Form 5500, Schedule C. Only plans with more than 100 participants were required to report under Schedule C and only the direct and non-eligible indirect compensation of service providers receiving more than \$5,000 needed to be reported. Eligible indirect compensation is compensation received by plan service providers that is paid out of fees assessed by investment fund providers where the investment provider serves simply as a conduit for payments for services provided by the record keeper. “Non-eligible” indirect compensation is paid by investment funds to service providers in which the investment fund is not simply a conduit for payment (in essence, the portion of the investment fee paid varies by service provider). See <https://www.faegrebd.com/schedule-c-disclosing-and-documenting-eligible-indirect-compensation>.

¹⁹ See <https://www.dol.gov/sites/default/files/ebsa/about-ebsa/our-activities/resource-center/faqs/schedulec.pdf>.

and direct compensation they expect to be paid from plan assets.²⁰ Importantly, rule 408(b)(2) also requires plan sponsors to consider the prospective compensation when assessing the reasonableness of the service provider's compensation. Perhaps most important, service providers are required to provide estimates of all compensation received as part of revenue sharing agreements. Prior this rule, plan sponsors were only required to report historical fees paid and service providers were required to report only the portion of revenue sharing payments that were used to offset direct fees (Wagner (2014)).

The second regulatory change made in 2012 was rule 404(a)(5), which required for the first time that plan sponsors disclose to participants the aggregate compensation received by plan service providers (both direct and all indirect compensation), the past performance and annual expenses (including investment management expenses and 12b-1 fees) associated with each of the investment options on the plan menu, and a comparison of the performance of each investment option to a peer or index based benchmark return. Most of the information required to be disclosed under 404(a)(5) was only available to plan participants before 2012 through mutual fund prospectuses and Statements of Additional Information (SAI). The goal of 404(a)(5) was to require plan sponsors to pull together performance and expense information for participants in a way that allowed participants to evaluate the performance of each investment option available on the plan menu.²¹ Note that while 404(a)(5) requires sponsors to disclose

²⁰ Rule 408(b)(2) also subjected service provider to substantial penalties if they failed to provide estimates of their expected compensation. At the extreme, service providers can potentially be forced to reimburse the plan for any service fees paid in violation of ERISA's prohibited transactions rules and the provider could also be subject to a 20% civil penalty by the DOL. See Wagner (2014).

²¹ The DOL explained the rationale for rule 404(a)(5) as follows: "The rule will ensure that workers in this type of plan are given, or have access to, the information they need to make informed decisions, including

aggregate indirect compensation, no disclosure is required to plan participants concerning the identity of funds making revenue sharing payments (i.e. which funds are providing revenue sharing payments). Participants are however provided information on the expenses associated with each investment option, including any 12b-1 fees and shareholder servicing fees.

To summarize, plan participants choices of investment options are generally limited to the investment options available on the plan menu which plan sponsors select. Bundled service providers typically advise plan sponsors regarding which investment options to include on the plan menu. Since 2009, with some exceptions, plan sponsors have been required to report direct administrative fees as well as indirect fees paid. Despite these disclosures, many plan sponsors appear to have been unaware that 12b-1 fees were being used to provide revenue sharing payments to service providers. Regulatory changes in 2012 were designed to increase the salience of indirect fees paid by (1) requiring service providers to disclose estimates of all prospective direct and indirect fees, (2) requiring plan sponsors to report to participants the aggregate direct and indirect fees paid to service providers and (3) requiring plan sponsors to disclose expenses associated with each investment option (including 12b-1 fees).

information about fees and expenses; the delivery of investment-related information in a format that enables workers to meaningfully compare the investment options under their pension plans; that plan fiduciaries use standard methodologies when calculating and disclosing expense and return information so as to achieve uniformity across the spectrum of investments that exist among and within plans, thus facilitating “apples-to apples” comparisons among their plan’s investment options; and a new level of fee and expense transparency.” See DOL fact sheet at <https://www.dol.gov/agencies/ebsa/about-ebsa/our-activities/resource-center/fact-sheets/direct-final-rule-provides-flexibility-for-the-timing-of-annual-disclosures-to-workers-in-401k-type-retirement-plans>.

The Potential Effects of Revenue Sharing Practices on Plan Expenses

How are the regulatory changes in 2012 expected to affect the structure and level of fees? In this section, we develop several hypotheses concerning the impact of required disclosure of indirect fees. We analyze the expected impact of salience through increasing disclosure requirements by using the framework developed by Inderst and Ottaviani (2012a and 2012b) to analyze compensation for advisory services. In their model, advisors serve to match consumers with investment options that are most suitable given the consumer's preferences. Their main insights are that the equilibrium fee structure, the level of fees charged, and the impact of disclosure requirements will depend on whether consumers are wary or naïve. Wary individuals are Bayesians, or whom Thaler and Sunstein (2008) refer to as "Econs", and rationally update their beliefs about advisor bias based on the contingent compensation that advisors receive. Naïve consumers are consumers who assume contingent commissions do not influence advisor recommendations.

Because plan sponsors are fiduciaries, we assume initially that they select investment options for the plan that they believe, based on the recommendations they receive, are in the best interest of plan participants. In other words, we assume that there is no agency conflict between plan sponsors and participants. As a result, advisors influence plan investments options through the advice they provide plan sponsors. Switching costs or other frictions imply that plan advisors have some market power. Given these assumptions, the model by Inderst and Ottaviani (2012) implies that the equilibrium contract for wary sponsors is one that provides the advisor only with a fixed fee paid by sponsors and no contingent indirect payments by investment providers. Intuitively, wary sponsors assume contingent commissions incent advisors to

provide biased advice, which reduces the price that wary consumers are willing to pay for the advice and the investment options recommended by the advisors (since they assume that less suitable products are recommended more often than they should be). Since wary sponsors rationally anticipate the quality of advice, the optimal incentive structure is one which leads to advice that is most informative, which occurs when the advisor receives fixed direct compensation from the sponsor.

The optimal compensation contract when sponsors are naïve is very different. Even when advisors receive indirect contingent commissions from investment providers, naïve plan sponsors do not update their beliefs concerning the quality of advice and thus don't adjust the price they are willing to pay for advice or the recommended products. As a result, contingent commissions enable advisors to extract higher rents than fixed fees. The optimal contract with naïve sponsors therefore involves compensation solely through indirect fees. If some sponsors are wary and other naïve and advisors are able to price discriminate, then wary sponsors will pay their service providers directly, whereas service providers of naïve sponsors will receive indirect compensation through the investment products they recommend to naïve sponsors. Ultimately, the overall expenses that participants in plans offered through naïve sponsors face will be higher than for the participants in plans offered by wary sponsors, because they end up paying more for the investment products that are offered through their plan.

If fund providers offer share classes with and without indirect compensation (in the form of 12b-1 fees) to record keepers and if indirect compensation is not disclosed, then all else equal, the model in Inderst and Ottaviani (2012) predicts that wary

sponsors will select the share class that does not charge a 12b-1 fee. In contrast, naïve sponsors will be directed to invest in share classes with 12b-1 fees. If fund providers offer only retirement share classes with 12b-1 fees, then wary sponsors may invest in share classes with 12b-1 fees if the disclosure of indirect fees is salient to them, so long as there is a dollar for dollar offset of direct for indirect fees.

While sponsors may vary in terms of their sophistication, their bargaining power, as well as their ability to monitor service providers, it is likely to be more costly for plan sponsors of small plans to conduct due diligence or monitor expenses on an ongoing basis, especially if there is a fixed component to monitoring and contracting costs. Thus, sponsors of small plans may not devote sufficient resources to fully understand alternative investment options or the incentives of bundled service providers. As a result, these sponsors may behave as if they are naïve because the disclosures of indirect fees paid are not sufficiently salient. In contrast, sponsors of large plans (by assets and/or the number of plan participants) are likely to have in-house benefit specialists that devote more time and resources to negotiating and monitoring their service provider contracts and thus are more likely to behave like wary sponsors.²² Moreover, large plans may also may be exposed to greater litigation risk, leading sponsors to behave like wary consumers.²³

²² For example, the Intel 401(k) plan has about \$4 billion in assets as of year-end 2010. An affiliate of Fidelity Investments serves as the plan's trustee and record keeper. The plan held about \$3.3 billion of its assets in over 60 mutual funds (only 6 of which were advised by Fidelity). The rest of the plan assets were held in common collective trusts and Intel company stock.

²³ See, for instance, *Lorenz v. Safeway, Inc.*, No. 4:16-cv-04903, *Krikorian v. Empower Retirement*, No. 1:16-cv-00094-MJW, *Tussey v ABB Inc.*, No. 2:06-cv-04305-NKL and others.

The baseline model abstracts from other factors that may influence the compensation contract. Indirect contingent fees may also affect the effort of service providers in becoming informed about specialized investment products or in negotiating with nonaffiliated investment providers. As a result, contingent fees may provide incentives to investigate the suitability and quality of specialized products and/or the fees charged by investment advisors. For example, indirect fees may facilitate fund providers charging different prices to different plans (reflecting potential economies of servicing larger plans and/or price discrimination) leading to indirect fees even when plan sponsors are wary. Indeed, if some plan sponsors monitor indirect fees paid to service providers more closely, they may prefer to pay some indirect compensation in order to get more favorable pricing from fund service providers.²⁴

If more comprehensive disclosure to plan sponsors regarding the compensation arrangements of service providers makes it easier for plan sponsors to identify potential agency problems arising from indirect compensation practices, as well as cases in which service providers might receive excessive indirect compensation, we would expect them to push for arrangements that rely more heavily on direct forms of compensation over indirect forms of compensation. Because indirect forms of compensation are frequently paid out of fees associated with the investment options offered, such as 12b-1 fees in the case of mutual funds, we would also expect a shift

²⁴ Moreover, even if plan service providers are able to price discriminate between naïve and wary plan sponsors, sophisticated plan participants of larger plans with more extensive investment menus might be able to undo part of the price discrimination by directing their contributions to the least costly investment options offered as part of plan, or by challenging the costs and fees paid by the plan and participants in court. Indeed, Ayres and Curtis (2014) find that 79% of plans in their sample offer at least one low cost index fund. They argue that this is likely due, in part, because plan menus that only incorporate high cost funds are more likely to be challenged in court.

away from indirect compensation to be related to changes in the menu of investment options offered under the plans. For plans that primarily offer mutual funds, we would expect to see an increased demand for mutual funds share classes that do not charge 12b-1 fees or sales loads, and are that therefore less likely to engage in revenue sharing with service providers.

The above discussion leads to four testable hypotheses:

Hypothesis 1: If the proportion of plan sponsors that are wary is increasing in plan size, then prior to 2012, large plans will pay a lower portion of compensation in the form of indirect fees than small plans.

Hypothesis 2: If rules 408(b)(2) and 404(a)(5) increase the salience of indirect fees for naïve sponsors, then there will be a shift from indirect compensation to direct compensation after 2012 and the shift will be greater for small plans than for large plans.

Hypothesis 3: If indirect fees facilitate price discrimination, then after 2012 there will be a decline in total compensation paid to service providers, and the decline will be greater for small, naïve plans than for large, wary plans. In other words, the difference between the absolute value of the decline in indirect compensations and the increase in direct compensation will be greater for small plans than for large plans.

Hypothesis 4: If greater salience of indirect fees leads to a substitution of direct for indirect fees, then the demand for fund shares with lower 12b-1 fees will increase after 2012. As a result, we expect flows to revenue sharing share classes to decline and the likelihood of mutual funds introducing retirement share classes with low 12b-1 fees to increase after 2012.

Data Sources

The data used in this paper come from a variety of different sources. We obtain information on pension plan characteristics, service provider compensation, and the mutual fund holdings of pension plans from Form 5500 and the relevant accompanying schedules from the Department of Labor website. The data on service provider compensation are machine readable. However, while the mutual fund holdings of pension plans are reported to the DOL as part of Schedule H, they are not reported in a machine readable format. For our analysis of retirement plan mutual fund holdings, we therefore hand-collect data on plans' mutual fund holdings for a random sample of 300 plans and manually match each mutual fund with the CRSP mutual fund database. The data on mutual fund share class introductions, flows, and fees are obtained from the CRSP mutual fund database. We provide descriptions of the data and the sample construction at the beginning of each section.

The Impact of Disclosure Salience on Service Provider Compensation

In this section, we examine the impact of the 408(b)(2) and 404(a)(5) disclosure requirements in 2012 on the composition of plan service provider compensation using a difference-in-difference framework. If indirect compensation practices facilitated price discrimination between naïve and wary sponsors, and increased disclosure requirements were salient, then we would expect to find that naïve sponsors will be less likely to agree to indirect compensation arrangements and will pay lower amounts of indirect compensation following the new disclosure requirements.

Pension Plan Data and Service Provider Compensation

Our data on pension plan characteristics and service provider compensation are obtained from Form 5500 filings and are downloaded directly from the DOL's website for

the plan years of 2010 through 2014.²⁵ While some plan service provider compensation data are available for the 2009 plan year, we begin our analysis in 2010 because the DOL granted some plan sponsors a grace period for full compliance until the 2010 plan year. Because we are interested in assessing the impact of two disclosure regulations that were implemented between March and August of 2012, we require that each plan in our sample has at least one observation prior to 2012 and at least one after 2012 (we exclude filings by plans whose plan year ends in 2012 or whose plan year includes more than six months in 2012). Additionally, we only include 401(k) plans in our sample and require that they have filed both Schedule C and Schedule H together with Form 5500.²⁶ We require that plans have at least 100 participants at the beginning of the plan year, because only these plans are required to file Schedule C, and further require them to have active participants.²⁷ To make our analysis of service provider compensation comparable across plans, we further eliminate plans that report a short plan year.²⁸

To assess the composition of service provider compensation, our preferred measures rely on data reported on Schedule C of Form 5500. Schedule C provides a breakdown of the total direct and indirect compensation received by each service

²⁵ Our download of the data is as of July 2017. Note that the DOL updates the data from plan years 2009 and onwards on a monthly basis and provides the latest, most correct filings for plans on its website. The data are available in text form from <https://www.dol.gov/agencies/ebsa/about-ebsa/our-activities/public-disclosure/foia/form-5500-datasets>.

²⁶ We identify 401(k) plans through the defined contribution benefit feature code “2J”.

²⁷ Active participants are individuals that are currently employed by the plan sponsor and are eligible to participate in the plan.

²⁸ A short plan year can occur when a plan is established or terminated, merged or consolidated with another plan, or when the annual date on which the plan year begins is changed. (See 29 CRR 2520.104-50). We identify short plan years based on Form 5500 data and whenever a plan reports for less than 12 months.

provider that received \$5,000 or more in total compensation (direct and indirect) from the retirement plan. It is important to note that the regulatory reporting requirements for Schedule C did not change after rules 408(b)(2) and 404(a)(5) were implemented, and therefore Schedule C allows us to make comparisons regarding service provider compensation arrangements before and after the increase in disclosure requirements through 408(b)(2) and 404(a)(5). We separately aggregate all direct and indirect payments made to service providers at the plan level and scale them by the average of total plan assets between the beginning and end of the plan year, which we obtain from Schedule H of Form 5500

While Schedule C provides a detailed breakdown of both direct and indirect compensation received by service providers, there are two drawbacks to relying solely on Schedule C data. First, only service providers that receive at least \$5,000 of total compensation are listed on Schedule C. Second, while direct compensation is required to be reported in a dollar amount, indirect compensation that service providers receive does not need to be reported in dollars. Instead, service providers may provide plan sponsors with a formula for how indirect compensation is calculated, and indicate that a formula was used on Schedule C.²⁹ Providing sponsors with only a formula as to how indirect compensation is calculated may serve to reduce the salience of indirect fees. The threshold reporting requirement for total direct and indirect fees and the use of a formula is likely to result in an underreporting of total compensation listed on Schedule C. We address potential underreporting of compensation in several different ways.

²⁹ For example, a service provider may report that they receive 15 bps of total assets invested with certain mutual funds in the form of revenue sharing agreements.

First, we include plan fixed effects in all of our empirical models. As a result, our coefficient estimates are identified solely by within-plan variation in direct or indirect compensation. Second, because direct compensation is likely to be left censored, we also estimate unreported Tobit models of direct compensation to mitigate concerns that the coefficient estimates are overestimated. Lastly, we conduct robustness tests using a proxy for our measure of direct compensation that does not suffer from left censoring: total administrative expenses scaled by average total assets. Administrative expenses are reported on Schedule H and capture all direct expenses paid from plan assets and therefore include direct expenses paid to service providers.³⁰ Furthermore, the two measures are highly correlated.

In all of our regression models, we include several plan characteristics as control variables that might be associated with the amount or the type of compensation that service providers receive. Specifically, we control for plan size (measured as the natural logarithm of average total plan assets over a plan year) as well as for the number of participants with account balances (measured as the natural logarithm). Given the potential economies of scale associated with managing larger retirement plans, larger plans should be more likely to pay lower overall compensation relative to total assets than smaller plans. Moreover, larger plans should find it easier to devote resources to monitoring and contracting and as a result are should be more likely to behave like wary consumers. Similarly, plans with more experience (as measured by the natural logarithm of plan age), and plans that are more attractive to participants (as

³⁰ Administrative costs from Schedule H can differ from total direct costs from Schedule C due to differences in the accrual basis used for each Schedule. Specifically, plans have discretion on whether to use cash accounting or accrual accounting on each schedule.

measured by the proportion of contributions made by the employer and the overall plan participation rate) might be more likely to monitor service providers, conduct comparative shopping for investment products, or devote more resources to structuring the plan.³¹ Additionally, to control for the fact that some retirement plans might rely more heavily on direct stock investments or separated accounts, we also include the proportion of plan assets invested in mutual funds as a control variable in all empirical models.

Summary Statistics and Univariate Analysis

Our final sample consists of 144,316 plan years by 39,519 individual 401(k) plans. Table 3-1 presents summary statistics for our sample and displays the mean values of our variables of interest separately for the plan years 2010 to 2011 and the plan years 2013 to 2014. Prior to 2012, the average plan in our sample has around \$50 million in average assets, 859 plan participants with accounts, and an overall participation rate of 70% of eligible employees. Additionally, over 60% of plan assets are invested in mutual funds. Overall, plans pay on average about 22 basis points in direct compensation relative to average total assets for record keeping and other services provided to the plan, and over 67% of plans report on Schedule C that service providers also receive some form of indirect compensation.

As discussed earlier, we assume that the likelihood the plan sponsor is wary is increasing in plan size. The idea behind plan size is that larger plans are more likely to be wary because they are more likely to have the resources to conduct due diligence

³¹ For example, Ayres and Curtis (2014) document that plans with greater employer contributions include more index funds and generally reduce losses to plan participants associated with excessive fees on investment products. They also find that plans with higher costs tend to have lower participation rates.

and monitor service providers. To investigate how compensation varies with plan size, we partition the sample in columns (3) through (10) of Table 3-1. To ensure that we are comparing the same plans across the two time periods, we calculate the average total assets of each plan for the pre-2012 period and divide the sample into quartiles based on that number.

Overall, we document substantial differences across plans of different sizes. Because our sample consists of Form 5500 filings, most plans in our sample are relatively small compared to other studies, such as Cohen and Schmidt (2009) or Pool, Sialm, and Stefanescu (2016), which mostly focus on plans offered by publicly traded firms and rely on 11-K data. Indeed, the average plan size in the first quartile is \$1.6 million and even plans in the third size quartile have on average only \$10.7 million in assets during the pre-2012 period. Not surprisingly, larger plans tend to be older, have higher participation rates, and include larger contributions by employers. Most importantly, larger plans face substantially lower costs, both indirect and direct compensation per dollar of assets. For example, the smallest plans in our sample pay on average about 36 basis points relative to total assets in direct compensation to service providers, whereas the largest plans only pay about 11 basis points. Both average direct and indirect compensation relative to plan assets is monotonically decreasing across size quartiles (the difference between size quartiles is significant at a 1% level).

Indirect compensation is frequently reported on Schedule C only as a formula. As shown in Table 3-1, in both the pre and post 2012 time periods about 40% of the plans report indirect compensation using a formula. Use of a formula complicates the

comparison of indirect to direct compensation. Because of this we define the percentage of indirect to total compensation in two ways. The first definition is simply the total dollar amount of indirect compensation divided by the total dollar amount of direct plus indirect compensation. Defining the percentage of indirect compensation in this way understates the indirect compensation relative to total compensation. In the second definition, we set the percentage equal to missing if direct compensation is greater than zero and indirect is only reported using a formula and we set the percentage equal to 100 if direct compensation is zero and indirect is greater than zero or is reported as a formula.

If larger plans are more likely to be wary, then larger plans are expected to compensate service providers through direct fees rather than indirect fees. Consistent with the prediction of hypothesis 1, we find the percentage of indirect to total compensation is significantly greater for the three smallest size quartiles compared to the largest quartile. For example, using the first definition, indirect compensation to total compensation is 20.32% for plans in the smallest size quartile compared to 12.36% for plans in the largest size quartile during the pre-2012 period (the difference is significant at the 1% level). Moreover, during the pre-2012 time period, the percentage of indirect compensation declines across each size quartile. Except for quartile 3, we find a similar pattern using the second measure of the percentage of indirect to total compensation.

To assess the effect of greater salience in the disclosure of compensation on the structure of service provider compensation, we compare direct and indirect compensation as well as total compensation relative to plan assets before and after the 2012 changes in disclosure requirements. As shown in Table 3-1, for the full sample we

find no difference in the direct compensation between the pre and post 2012. In contrast and consistent with hypothesis 2, indirect compensation relative to total assets falls after 2012 from 9 basis points to 6 basis points, which is significant at the 1% level. More important, we find the decrease in indirect compensation is greater for smaller plans than for the largest plans. For example, indirect compensation relative to assets declines by 4 basis points for plans in the smallest three size quartiles compared to about a 2 basis point change for the plans in the largest size. Since we find very little change in direct expenses, the decrease in indirect compensation results in a decrease in total compensation after 2012 for the full sample. Moreover, consistent with prediction of our third hypothesis, we find that the decrease in total compensation is greater for smaller plans. For example, total compensation declines 6 basis points for plans in the smallest quartile, compared to a 1 basis point decline for plans in the largest quartile.

The Impact of Disclosure Requirements on Compensation Paid by Pension Plans

To assess the effect of disclosure on plans' compensation arrangements, we employ a difference-in-difference analysis with controls for plan characteristics as well as plan fixed effects. In addition to comparing the impact of disclosure requirement changes by plan size quartiles, we also use an indicator variable based on whether plan assets are below or above the median pre-2012 plan size. Assuming that plan size is a proxy for sponsor sophistication, we expect the impact of disclosure requirements to be greatest among smaller plans. To reiterate our earlier discussion, the idea is that larger plans are more likely to be wary because they are more likely to have the resources to conduct due diligence and monitor service providers.

We begin by analyzing the impact of disclosure requirements on the level of indirect expenses to total assets. As mentioned above, measuring the amount of indirect compensation that service providers receive is difficult because some service providers do not report a dollar amount for Schedule C reporting purposes, but disclose indirect compensation through formulas instead. The inclusion of plan fixed effects in all of our regression models helps to alleviate this concern, because identification of the coefficients will only be through within plan changes in the dollar amount of indirect compensation on Schedule C, and plans whose service providers only provide disclosure through formulas will not contribute to the identification.³²

In Table 3-2, we present linear regression models where the dependent variable is the dollar amount of indirect compensation relative to total assets. We find that the level of indirect compensation relative to total plan assets declines across all plans in our sample, regardless of size, and that this decline is significant at the 1% level. Consistent with our second hypothesis, we document a larger decline for plans that are more likely to be associated with naïve sponsors. In particular, as shown in column (2) we find that the indirect compensation declines significantly more for small plans than for large plans and that the magnitude of this difference is substantial. The decline for large plans is 2.6 basis points, whereas small plans experience a decline nearly 75% larger, at 4.5 basis points. We also observe a strict monotonic relationship in the coefficient estimates in columns (3) through (6), again consistent with our predictions discussed earlier. In untabulated analysis, we repeat this analysis on a subsample of

³² Furthermore, we include an indicator variable for whether a plan reports indirect compensation through a formula on Schedule C. This mitigates concerns that changes in reported indirect compensation might be mechanically related to changes in the way service providers disclose indirect compensation.

plans which excludes plans that report indirect compensation only by formula and find consistent results.

While our findings are consistent with the notion that increased disclosure requirements limit the ability of service providers to extract rents from naïve plan sponsors, the model by Inderst and Ottaviani (2012) also predicts that once naïve plan sponsors are aware of the incentive conflicts inherent in indirect compensation arrangements, they will prefer to use direct compensation arrangements. As a result, we would expect the level of direct compensation paid by naïve plan sponsors to increase following 2012.

We examine this in Table 3-3 using linear regression models where the dependent variable is the dollar amount of direct compensation paid relative to total plan assets. As in our other specifications we control for plan fixed effects and use plan size as a proxy for plan sponsor naiveté. Overall, the results in Table 3-3 indicate that direct compensation increased for the full sample and for all but the smallest size quartile of plans. Not surprisingly, given that indirect fees falls across all size quartiles and that direct compensation either remains constant or increases, we also find that the proportion of indirect compensation relative to total compensation falls across all plan sizes in untabulated analysis.

Finally, if indirect fees facilitate price discrimination and disclosure salience reduces the ability of service providers to obfuscate their compensation, then hypothesis 3 predicts a greater decline in total compensation for small plans after 2012. Table 3-4 provides evidence consistent with this hypothesis. The dependent variable in the regressions presented in Table 3-4 is the ratio of total compensation (both direct

and indirect) to plan assets. In cases where indirect compensation is only reported as a formula, total compensation consists only of direct expenses. As a robustness check, we also estimate regressions using a subsample of plans that report at least a portion of their indirect expenses in dollars and find consistent results. Overall, we find a significant decrease in total compensation for all plan size quartiles except for the largest quartile. As shown, the coefficient on Post 2012 decreases in absolute value as plan size increases. For the plans in the smallest two size quartiles, total compensation declines by 5.1 and 3.1 basis points, respectively, representing a decline of about 10% relative to the pre-2012 level of total compensation. In contrast, the insignificant coefficient estimate in column (6) indicates that decreases in indirect compensation among the largest plans were offset dollar for dollar by increases in direct expenses.

Overall, the results in Table 3-4 are consistent with the hypothesis that salient disclosure of indirect fees mitigates price discrimination. Given the disclosure requirements prior to the introduction of 408(b)(2) and 404(a)(5), we suspect that our results understate the impact of salient disclosure requirements. We suspect this because 408(b)(2) requires plan service providers to disclose the total indirect compensation that they expect to receive, while prior to 2012 sponsors were only required to report on Schedule C the portion of indirect expenses that were used as an offset of direct expenses. As a result, indirect compensation is likely to be underreported prior to 2012, leading to attenuation in the change in indirect compensation and therefore total compensation after 2012.

The Impact of Disclosure on the Demand for “Transparent” Mutual Funds

Our analysis of Schedule C in the previous section suggests a significant shift in the composition of service provider compensation after 2012. Since indirect

compensation is typically paid, at least in part, through the sharing of certain investment fees, a change in the salience of indirect fees is expected to result in an increase in the demand for mutual funds with a lower incidence of revenue sharing. To examine this issue, we analyze the movement of fund flows into low-cost share classes and the introduction of low-cost share classes that target 401(k) retirement plans before and after the change in disclosure requirements.³³ An analysis of share class introductions and flows into low cost retirement share classes provides an additional test of the impact of the change in disclosure requirements on service provider compensation structure. We can also use changes in flows and share class introduction among retail share classes (as defined below) as a control group in a triple difference framework. Moreover, as discussed earlier, the longer time series of mutual fund data from CRSP allows us to conduct placebo tests to identify whether 2012 is the year in which a structural break occurs.

Mutual Fund Data and Revenue Sharing

For analyses on the shift in investor demand, we rely upon the Center for Research in Security Prices (CRSP) survivorship bias free mutual fund database from 2003 to 2016. Using CRSP data, we are able to incorporate information on mutual fund fees, flows, and monthly performance, both at the share class and fund level. This data allows us to evaluate the general response to disclosure in the aggregate mutual fund industry, as well as the specific response in a hand-collected sample of 401(k)

³³ Industry sources attribute the increase in retirement share classes, such as “R6” classes, as a way for mutual funds to meet the demand by sponsors for more direct and less indirect compensation to service providers. As Plan Sponsor magazine, an industry publication explains, a “focus on fairness and fiduciary fitness is driving many investment product providers to implement R6 share classes and other institutional offerings with zero revenue sharing”. See <https://www.plansponsor.com/share-class-offerings-shift-with-fiduciary-focus/>.

retirement plans, in which we merge disclosed plan menus with fund characteristics from CRSP.

As we've discussed, our research question is specifically concerned with how indirect payments change in the presence of increased disclosure and we therefore require a measure of revenue sharing between investment providers and plan service providers. Although the amount of revenue sharing varies not only by mutual fund within a given fund complex, but even within a given fund among various share classes, most revenue sharing fees take the form of shareholder servicing fees, sub-transfer agency fees, or reimbursed 12b-1 fees.³⁴ Because the CRSP mutual fund database does not contain information on sub-transfer agency or shareholder servicing fees, we use 12b-1 marketing fees as a proxy for revenue sharing throughout our analyses.³⁵

While our selection of 12b-1 fees as a proxy for revenue sharing potentially introduces measurement error into our independent variables, since 12b-1 fees are not always the sole mechanism for revenue sharing and are not always fully shared with service providers, this would bias us against finding significant results. This suggests that our conclusions understate the true impact of heightened disclosure. To further ease concerns about measurement error, we also make use of indicator variables for the existence of 12b-1 fees and variables indicating the relative magnitude of 12b-1 fees.

³⁴ See, for instance, GAO (2011), Table 3 and Table 5.

³⁵ The use of 12b-1 fees as a proxy for revenue sharing agreements between mutual fund companies and service providers is also validated by "Revenue Sharing: What Is It?" from the 2008 edition of Plan Sponsor magazine, which states "The 401(k) industry calls it revenue sharing. The mutual fund industry calls it 12b-1 fees, sub-transfer agency fees, shareholder servicing fees, and profit-sharing payments. The Department of Labor (DOL) calls it indirect payments."

For the first set of tests we perform using CRSP data, we rely upon information taking place at the share class level. We collect monthly data on all mutual fund share classes contained in the CRSP database that have non-missing data for returns, size, the expense ratio, the 12b-1 fee, and the CRSP objective code. We also require two consecutive months of populated data, allowing us to construct lagged variables and calculate net flows. We calculate flows in the same way as in Sirri and Tufano (1998), defined as:

$$FlowPercentage_t = 100 \times \frac{TotalNetAssets_t - (TotalNetAssets_{t-1} \times Return_t)}{TotalNetAssets_{t-1}}$$

We then assign each share class in the database a type, using Regular Expressions to capture patterns in fund names. This allows us to differentiate between share classes targeted towards retail investors and those directed towards retirement and institutional clientele. This empirical strategy is similar to that employed by James and Karceski (2006), who examine variation in fund performance by a retail or institutional focus and the degree of investor oversight. In our setting, share class names containing “Class R Shares”, “R-1”, “R-2”, “R-2E”, “Retirement Shares”, “R CI”, or similar will be identified as retirement share classes, while institutional share classes are identified by patterns such as “Class I Shares” or “Inst CI Sh”. We group share classes of this type as “non-retail” and classify all remaining as “retail”. The distinction is useful in both our share class creation and flows analyses, as we expect to find a change in demand among retirement investors, but have no reason to suspect a parallel shift among retail investors.

We also perform analysis at the fund-level, which requires aggregating the share class data in CRSP. In each month, we construct fund-level measures by value-

weighting data across all share classes in a given fund, weighting observations by lagged total net assets. Once again, we require non-missing data on relevant control variables.

We add an identifier for months in which the fund adds a new share classes to this panel dataset. We further divide the creation of new share classes into four separate categories. First, we categorize the new share class as being targeted towards retail or non-retail clientele, using the same text search described above. Second, we identify whether the revenue sharing fees of the newly created share class are higher or lower than the value-weighted average fee of the fund in the prior month. Each outcome is defined as the product of these two indicators. Using these four outcomes, we conduct the multinomial logit analyses described below. The mutual fund datasets contain 2,018,682 and 532,950 observations at the share class and fund level, respectively, and summary statistics are presented in Table 3-5.

The Impact of Disclosure on Mutual Fund Flows

Our first analysis, presented in Table 3-6, examines how mutual fund flows respond to the 2012 disclosure requirements. We implement this test in a triple difference setting, which allows us to measure the change in demand between retail and non-retail share classes that engage in revenue sharing before and after disclosure. The triple difference specification also allows us to make a stronger claim of causality than our earlier analyses.

The goal of this analysis is to explore how mutual fund flows shifted between investment options in the pre- and post-2012 periods. By utilizing a triple difference approach, we can determine how flows moved among retirement and institutional share classes, which are primarily targeted towards large investors such as pension plans,

before and after the passage of disclosure regulations in 2012, relative to retail share classes. Put differently, this allows us to capture how non-retail investors shifted their flows among share classes with differential fees relative to the behavior of retail investors over the same period. While a more direct test would be to use the actual revenue sharing payments provided by mutual funds to service providers, the CRSP database does not contain that information. Instead, we use the 12b-1 fee, both as an indicator variable and as a continuous measure, to proxy for revenue sharing, a decision motivated by the 2011 GAO report and various trade publications.

The dependent variable in our model is the flow percentage in each month as defined in above, winsorized at 1% and 99% to reduce the influence of outliers, while the independent variables are an indicator variable indicating whether the observation is from the post 2012 time period, a measurement of the 12b-1 fee, an indicator variable indicating non-retail share classes, and interactions of the above. We also include the lagged return as well as objective and year fixed effects to control for other determinants of fund flows. Note that this analysis takes place at the share class level, allowing us to identify flows between share classes with differential fee structures, and therefore has more observations than later analyses taking place at the fund-level.

In columns (1) and (2) of Table 3-6, the fee variable is an indicator variable whether the share class includes a non-zero 12b-1 fee. The coefficient of interest in the regression is the triple interaction variable, Post x Non-Retail x Fee, which is designed to measure any difference in the change of flows into shares with 12b-1 fees after 2012 between non-retail and retail funds. Since disclosure requirements only applied to retirement plans, who are largely expected to offer non-retail share classes, we expect

the coefficient on the triple interaction variable to be negative if plans shifted to share classes without 12b-1 fees. As shown in columns (1) and (2), the coefficient on the triple interaction term is negative and significant at the 1% level, indicating that mutual fund flows to 12b-1 fee bearing non-retail share classes fell by around 2.8% after the implementation of disclosure regulation relative to the movement of flows among retail share classes.

In columns (3) and (4), we conduct the analysis using a continuous measure of 12b-1 fees. As shown, we find that for each 1%-point increase in the 12b-1 fee charged by a share class, flows decline by approximately 2.5% in the post disclosure period among non-retail share classes. In our sample, the average monthly flow percentage is 0.46%, so these changes represent a dramatic and economically significant decline in flows. Taken together, the evidence presented in Table 3-6 supports our fourth hypothesis, that demand for share classes with lower revenue sharing increased after the passage of more salient disclosure regulations.

Introduction of New Share Classes

To extend our analysis further, we analyze the frequency with which mutual funds add new share classes to their offerings. We first examine the simple time series of share classes creation in Figure 3-1. As shown, we observe a similar pattern in the creation of retail and non-retail share classes prior to 2012, consistent with a parallel trend assumption before the change in disclosure regulations for retirement plans. However, in 2012 and afterwards, we observe a sharp increase in the number of initiation of share classes targeted towards retirement and institutional clientele.

This increase is consistent with the idea that in the wake of increased fee transparency, fund complexes began offering additional share classes that offered

different compensation structures. Anecdotal evidence suggests that funds' motivation was to introduce new plans with lower or zero revenue sharing to service providers. For instance, in March 2013, Neuberger Berman announced R6 share classes for seven of their mutual funds and issued a statement that reads: "In response to client demands for increased transparency and flexibility...Neuberger Berman Group LLC is pleased to introduce retirement share classes...without front-end sales charges, contingent deferred sales charged, or 12b-1 fees." Wells Fargo released a similar statement explicitly stating that their new "Class R6 has a lower net expense ratio than any other share class and does not offer any payments, such as sub-transfer agent fees, shareholder servicing fees, 12b-1 fees, or revenue share, to retirement plan sponsors or recordkeepers".

To confirm the intuition of our univariate time series and more rigorously test the anecdotal evidence we've presented, we also analyze the creation of new share classes in a multivariate setting. While share classes of the same fund provide exposure to the same investments and risks, having numerous share classes allows fund providers to offer differential fee structures to different customers. If the passage of disclosure regulation created demand for share classes without revenue sharing payments from mutual funds to service providers, we should be able to observe the creation of share classes with lower revenue sharing payments, even when controlling for other fund-level characteristics.

To perform the multinomial logit test, we construct a monthly time series at the fund level with variables such as the fund-level return and expense ratio. In each month, we then identify whether a share class was added to the fund, and if so, what

type, either retail or non-retail. We also identify whether the newly created share class has a higher or lower 12b-1 fee than the pre-existing fund.³⁶ The combination of retail/non-retail and the relative magnitude of the 12b-1 fee allow us to designate four distinct types of new share classes. Using the absence of a new share class as the base case, we perform a multinomial logit analysis in Table 3-7 that explores the determinants of share class creation. This analysis is similar to tests in Nanda, Wang, and Zheng (2009), who analyze factors associated with new share class creation.

The results in column (4) indicates a significant and economically important increase in the likelihood of adding a retirement share class with lower 12b-1 fees following 2012. The odds of adding a low-fee non-retail share class relative to adding no new share class increase by 16.7% in the post disclosure period, whereas the relative odds of adding retail share classes or non-retail share classes with high fees all decline by a statistically significant amount. These multivariate results indicate that demand for share classes that do not engage in revenue sharing increased after 2012, consistent with our univariate results, anecdotal evidence, and the predictions of our fourth hypothesis.

Placebo Results

Our empirical analyses thus far are reliant upon the usage of 2012 as a breakpoint. We theorize that heightened disclosure resulting from 408(b)(2) and 404(a)(5) caused a shift in the structure of service provider compensation, in mutual fund flows, and in the propensity to create non-retail share classes. However, it is

³⁶ As a robustness check, we also perform this analysis using the expense ratio rather than 12b-1 fees. The four outcomes are then defined as a combination of retail/non-retail and whether the newly created share class has a higher or lower expense ratio than the pre-existing fund. Our conclusions remain unchanged when performing this check.

possible that our analyses are capturing a time trend and therefore the relationships we have discussed are not causal, but merely associative.

To mitigate these concerns and validate our empirical strategy, we re-estimate our empirical analyses on placebo event years, as in Miller (2009). Although we would like to perform this experiment using Form 5500 data, the short time series and changes in form structure in 2009 preclude us from doing so. However, the ready availability and longer time series of the CRSP mutual fund data allow us to perform placebo tests on both of our mutual fund analyses, that of fund flows and of share class creation.

The first of these analyses is presented in Table 3-8. We re-estimate the triple difference specification from column (1) of Table 3-6 for each year from 2009 to 2013. To allow for comparison between each of these placebo event years, we run each regression in a balanced manner, including eight years of data from $t-4$ to $t+3$, where t represents the placebo event year. The post disclosure indicator variable is redefined to equal 0 for all months taking place prior to the placebo event year and 1 for all months occurring during and after the placebo event year. Other independent variables maintain their definitions from Table 3-6. When examining the coefficient on the triple interaction term (Post Disclosure \times Non-Retail \times Fee) in Table 3-8, we find that using 2012 as a breakpoint has the strongest statistical significance and the magnitude of the point estimate is second-highest among all placebo years. This supports our belief that 2012 is a logical breakpoint in the data and that our prior results are not driven by a spurious time trend.

We also perform placebo analyses on the creation of new share classes. We re-run the multinomial logit from Table 3-7 for each year from 2009 to 2013 and present

the results in Table 3-9. Once again, these tests are performed in a balanced manner, including eight years of data from t-4 to t+3, where t represents the placebo event year. For brevity, we only report coefficients and marginal effects for the outcome of creating a non-retail share class with a 12b-1 fee lower than that of the pre-existing fund in the prior month.³⁷ The post disclosure indicator variable has the highest point estimate, greatest statistical significance, and largest marginal effect when using 2012 as a breakpoint. In fact, the marginal effect estimated at the means suggests a 78% increase in the creation of non-retail share classes with lower fees relative to the pre-disclosure era. Overall, these results provide support for our empirical methodology and lend credence to the claim that increased disclosure in 2012 had a causal effect on plan fee structure and the response among mutual funds.

The Impact of Disclosure on the Investment Options Offered by Retirement Plans Hand-Collected Retirement Plan Menus

For the tests in this section, we combine plan-level data from the Form 5500 with quarterly mutual fund characteristics from CRSP for a hand-collected sample of 300 randomly selected retirement plans. To do so, we programmatically scrape the Department of Labor website to capture plans' "Schedule of Assets" for the plan years of 2010 through 2014.³⁸ Schedule H of the Form 5500 requires this data be included as an attachment for plans that hold assets for investment (such as mutual funds, separate

³⁷ Placebo regression results for the remaining outcomes (the creation of retail share classes as well as the creation of non-retail share classes with higher 12b-1 fees) are available from the authors upon request.

³⁸ Among the random sample, our web-scraping algorithm captures the "Schedule of Assets" for 97% of plan-year observations. However, the PDF files need to be converted into Excel files and because some PDF files are uploaded as scanned documents our software can only convert PDF of about 239 plans.

accounts, and direct stock investment).³⁹ While certain information is required, such as the identity of the issuer, a description of the investment, and the current value as of the year-end, the schedules are not provided in a standardized format and generally do not provide any standardized investment identifiers (i.e. CUSIP or tickers). Moreover, in most cases the exact share classes of the mutual funds are not reported. This requires that we manually review each schedule to standardize naming conventions and to classify the assets held by the plan.

We exclude all individual brokerage accounts, direct stock or bond investments, cash accounts, and participant loans from our sample and only keep pooled investment vehicles such as mutual funds, stable value funds, and pooled separate accounts. We hand-match each mutual fund to the CRSP mutual fund database using a name search. Because the share classes are not reported in many cases, we match the mutual funds to CRSP at the fund complex level and calculate our fund level expense measures across all share classes of the respective mutual fund.

We merge our hand matched sample with the plans from which we obtained Form 5500 data and Schedule C compensation data. From the 20,487 investment options held by the 300 randomly selected plans, we are able to obtain matches to CRSP for 16,966 investment options by 210 individual plans. To assure that our matches are relatively accurate we further condition the sample such that the difference between the total dollar amount of matched mutual funds and the dollar amount of

³⁹ The few investments excepted from this reporting requirement include items such as debt obligations of the U.S. or any U.S. agency, bank certificates of deposit with a maturity less than one year, or commercial paper under certain circumstances. None of these investments offers revenue sharing and is therefore not necessary for our analyses.

mutual fund holdings reported on Schedule H of Form 5500 does not exceed 15% of total plan assets. This reduces the sample to 170 individual plans. Lastly, for our analysis, we require that each plan have an observation both prior and post 2012 and we require the same data filters as for our Form 5500 plan-level sample described in Table 3-1. This leaves us with 328 plan-year observations by 105 unique plans.

Changes in Plan Menu in Response to Heightened Disclosure

Table 3-10 presents the summary statistics for our random sample as well as for the full sample of all plans based on our Form 5500 data. Because our random sample consists of plans that mostly invest in mutual funds, it is not surprising that the average plan in our random sample is slightly smaller and relies more on mutual funds than the average defined contribution plan in our full sample. However, consistent with the notion that service providers are more likely to receive revenue sharing from mutual funds plans in our random sample, on average, have lower direct expenses but rely more heavily on indirect forms of compensation instead. Despite the small average plan size, the number of investment options offered is substantial. On average, plans in our random sample offer 23 distinct investment options, most of which are mutual funds with the remainder being predominantly stable value funds and occasionally separated accounts.

Because we cannot always identify the mutual fund share class offered on plan menus, we assign the value weighted expense ratio across all share classes of the fund as its expense ratio. To assess whether a mutual fund is low cost, we compare it to the mean expense ratio of other funds based on the same CRSP objective code, the same classification of active versus index funds, and the same year and quarter. We define a fund as low cost if its expense ratio is 50 basis points below the average expense ratio

of its peers. The mean expense ratio across all mutual funds of a plan averages about 80 basis points, and despite the large number of investment options only about 18% of them are considered low cost mutual funds.

Consistent with our hypotheses and our results above, Table 3-10 also shows that direct costs for the plans in our random sample increased significantly following 2012, and they further indicate that indirect compensation overall declined. Moreover, the average expense ratio of mutual funds on plan menus declined significantly by about 10 basis points, and the number of low cost investment options increased by about one fund.

To analyze the changes on plans' investment menus formally, we estimate a series of linear models in Table 3-11 and control for the same covariates as in our other regressions. Because of the small sample size, we cannot use firm fixed effects. Instead we include industry fixed effects, based on 2-digit NAICS codes, and plan size quartile fixed effects based on pre-2012 assets. As shown in column (1) of Table 3-11, we find that the average expense ratio of mutual funds on plan menus declines by 9 basis points after 2012 (significant at the 1% level). Moreover, consistent with this decline in expense ratios, the number of low cost funds increases by 1.4 funds on average and the fraction of low cost investment options increases by about 5% (both significant at the 5% level).

Chapter 3 Concluding Remarks

In this paper, we study the salience of disclosure regulation. Specifically, we examine how several regulations imposed by the Department of Labor in 2012 impacted the level and composition of compensation paid to service providers of 401(k) retirement plans. Overall, we find that salient disclosure causes a substitution of direct

compensation for indirect compensation and a reduction in total compensation, especially among small plans that are likely to be naïve. We also present analyses that explore the response in the mutual fund industry. We find that demand for share classes that do not engage in revenue sharing increased after the passage of more salient disclosure regulations, both in net flows and in the creation of new share classes with lower 12b-1 fees. Finally, on a hand-collected sample of pension plan menus, we identify a significant decline in the average expense ratio and an increase in both the number and fraction of low-cost investments available to plan participants.

The evidence we present is consistent with recent theoretical models on commissions paid to advisors and suggests that disclosure, when salient, can alleviate conflicts of interest. Our work extends the literature on the effectiveness of disclosure and explores how public policy can inform consumers about complex financial products. In closing, our findings suggest that the salience of disclosure is an important determinant of policy success.

Table 3-1. Summary Statistics of Pension Plan Characteristics and Compensation Paid.

	<u>Full Sample</u>			<u>Q1</u>			<u>Q2</u>			<u>Q3</u>			<u>Q4</u>		
	Pre	Post		Pre	Post		Pre	Post		Pre	Post		Pre	Post	
Plan Characteristics															
Avg. Assets (in \$mn)	49.73	67.31	***	1.63	2.61	***	4.60	6.86	***	10.66	15.47	***	175.79	243.17	***
No. Participants w. Accounts	858.60	930.83	**	115.16	140.30	***	182.72	212.24	***	294.57	343.24	***	2746.83	3013.77	**
Employer Contr. (in %)	24.15	25.02	***	17.85	18.98	***	21.02	22.18	***	25.36	26.47	***	31.74	32.30	***
Participation Rate (in %)	70.09	70.66	***	48.50	49.42	***	68.77	69.14		78.43	79.32	***	82.94	84.25	***
Mutual Funds (in %)	60.73	64.78	***	55.08	58.73	***	59.78	64.41	***	64.27	68.87	***	63.35	66.96	***
Plan Age (in Years)	19.47	22.32	***	13.14	15.89	***	18.54	21.45	***	21.54	24.59	***	24.15	27.20	***
Compensation Paid															
Admin Exp. to Assets (in %)	0.25	0.24	***	0.42	0.39	***	0.27	0.25	***	0.19	0.19		0.12	0.12	***
Direct Comp. to Assets (in %)	0.22	0.22		0.36	0.34	***	0.25	0.24	***	0.17	0.18	**	0.11	0.12	***
Indirect Comp. to Assets (in %)	0.09	0.06	***	0.13	0.09	***	0.11	0.07	***	0.09	0.05	***	0.04	0.02	***
Total Comp. to Assets (in %)	0.31	0.28	***	0.49	0.43	***	0.36	0.31	***	0.26	0.23	***	0.15	0.14	***
Indirect Comp. Paid	0.67	0.70	***	0.62	0.62		0.66	0.68	***	0.69	0.73	***	0.72	0.75	***
Indirect Comp. Formula Only	0.40	0.41	***	0.32	0.31	**	0.36	0.37	***	0.41	0.43	***	0.50	0.51	***
Ind. to Total Comp. (in %) (1)	17.38	15.04	***	20.32	15.96	***	18.99	16.25	***	18.54	17.26	***	12.36	10.86	***
Ind. to Total Comp. (in %) (2)	32.13	27.82	***	34.63	26.57	***	32.27	28.06	***	34.03	32.00	***	26.96	24.19	***
No. Plan Years	70,553	73,763		16,748	18,119		17,546	18,473		18,006	18,658		18,253	18,513	
No. Plans	39,519	39,519		9,880	9,880		9,880	9,880		9,880	9,880		9,879	9,879	

This table presents summary statistics for the pension plans in our sample based on Form 5500 data obtained from the DOL. Columns (1) and (2) report the mean values for the full sample prior to 2012 and post 2012, respectively. The remaining columns report the mean values by size quartile. For each plan, we calculate the average total assets across the years 2010 and 2011, then sort plans into quartiles based on their average total assets during the pre-2012 period. The difference in means between the two time periods is based on a t-test assuming unequal variances. We use *, **, and *** to denote that the difference is significantly different from zero at the 10%, 5%, and 1% level, respectively.

Table 3-2. Change in Indirect Compensation.

Panel A: Level of indirect compensation						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Full				
	Sample	Sample	Q1	Q2	Q3	Q4
Post 2012	-0.033*** (15.96)	-0.026*** (12.00)	-0.050*** (9.99)	-0.043*** (9.53)	-0.029*** (6.31)	-0.016*** (6.74)
Post 2012 x Small Plan		-0.019*** (6.92)				
Ind. Formula	-0.013*** (4.22)	-0.013*** (4.38)	-0.013* (1.69)	-0.015** (2.44)	-0.015** (2.57)	-0.011*** (2.88)
Log(Avg. Assets)	-0.014*** (2.62)	-0.013** (2.35)	-0.006 (0.54)	-0.032*** (2.74)	-0.020 (1.64)	-0.006 (1.09)
Log(Participants)	0.004 (1.00)	0.004 (0.96)	0.003 (0.36)	0.016* (1.68)	0.008 (0.89)	-0.002 (0.42)
Employer Contr.	-0.000 (1.39)	-0.000 (1.35)	-0.000 (1.39)	-0.000 (0.62)	0.000 (0.09)	-0.000 (0.83)
Participation Rate	0.000* (1.93)	0.000* (1.71)	-0.000 (0.94)	0.000 (1.34)	0.000** (2.14)	0.000* (1.76)
Log(Plan Age)	0.003 (0.48)	0.009 (1.38)	0.018 (1.19)	0.024* (1.65)	-0.011 (0.85)	-0.001 (0.09)
Mutual Funds	0.000*** (3.06)	0.000*** (3.05)	0.000*** (3.86)	0.000** (2.10)	-0.000 (0.73)	-0.000 (1.20)
Constant	0.076*** (2.89)	0.058** (2.20)	0.074 (1.38)	-0.011 (0.21)	0.109* (1.91)	0.082** (2.32)
Adj. R-Square	0.517	0.518	0.572	0.455	0.471	0.490
N	144316	144316	34867	36019	36664	36766
Panel B: Marginal effects						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Full				
	Sample	Sample	Q1	Q2	Q3	Q4
Change for Small Plans		-0.045***				
P-value		[0.000]				

Panel A of this table presents linear models where the dependent variable is the total indirect compensation paid scaled by plan assets. The models all control for plan fixed effects. Columns (1) and (2) estimate the model for the full sample, and columns (3) through (6) partition the sample by pre 2012 size quartiles. Ind. Formula is an indicator variable for whether indirect compensation is reported as a formula. Small Plan is an indicator variable that takes a value of one if the plan has average assets below the sample median prior to 2012. Panel B presents the marginal effects for the relevant interaction terms. Absolute values of t-statistics are in parentheses, p-values are in brackets, and standard errors are clustered by plan. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-3. Change in Direct Compensation.

Panel A: Level of direct compensation						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Q1	Q2	Q3	Q4
Post 2012	0.011*** (4.77)	0.017*** (7.62)	-0.000 (0.01)	0.011** (2.38)	0.015*** (4.24)	0.012*** (4.79)
Post 2012 x Small Plan		-0.016*** (6.07)				
Log(Avg. Assets)	-0.041*** (6.41)	-0.040*** (6.23)	-0.035** (2.51)	-0.062*** (4.98)	-0.048*** (4.70)	-0.017** (2.17)
Log(Participants)	0.020*** (3.50)	0.020*** (3.47)	0.017 (1.37)	0.024** (1.99)	0.028*** (2.81)	0.011 (1.58)
Employer Contr.	-0.000 (0.82)	-0.000 (0.79)	-0.000 (0.53)	-0.000 (0.53)	-0.000 (1.10)	0.000 (0.98)
Participation Rate	0.000** (2.55)	0.000** (2.40)	0.000 (1.25)	0.000** (2.08)	0.000 (1.20)	0.000 (0.08)
Log(Plan Age)	-0.002 (0.24)	0.003 (0.36)	0.002 (0.10)	-0.004 (0.21)	0.019* (1.70)	0.000 (0.03)
Mutual Funds	0.000** (2.22)	0.000** (2.20)	0.000 (1.05)	0.000 (0.57)	0.000** (2.37)	0.000** (2.08)
Constant	0.174*** (5.20)	0.159*** (4.73)	0.264*** (3.74)	0.203*** (2.80)	0.046 (0.87)	0.081** (1.98)
Adj. R-Square	0.762	0.762	0.725	0.753	0.765	0.770
N	144316	144316	34867	36019	36664	36766
Panel B: Marginal effects						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Q1	Q2	Q3	Q4
Change for Small Plans		0.002				
P-value		[0.609]				

Panel A of this table presents linear models where the dependent variable is the total direct compensation paid scaled by plan assets. The models all control for plan fixed effects. Columns (1) and (2) estimate the model for the full sample, and columns (3) through (6) partition the sample by pre 2012 size quartiles. Small Plan is an indicator variable that takes a value of one if the plan has average assets below the sample median prior to 2012. Panel B presents the marginal effects for the relevant interaction terms. Absolute values of t-statistics are in parentheses, p-values are in brackets, and standard errors are clustered by plan. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-4. Change in Total Compensation.

Panel A: Level of total compensation						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Full				
	Sample	Sample	Q1	Q2	Q3	Q4
Post 2012	-0.022*** (7.19)	-0.008*** (2.61)	-0.051*** (6.56)	-0.031*** (4.82)	-0.013** (2.37)	-0.003 (1.01)
Post 2012 x Small Plan		-0.035*** (9.63)				
Ind. Formula	-0.053*** (11.13)	-0.054*** (11.32)	-0.081*** (6.24)	-0.070*** (7.39)	-0.043*** (5.51)	-0.016*** (3.09)
Log(Avg. Assets)	-0.055*** (6.62)	-0.052*** (6.28)	-0.040** (2.31)	-0.093*** (5.58)	-0.067*** (4.19)	-0.023** (2.37)
Log(Participants)	0.024*** (3.33)	0.024*** (3.29)	0.020 (1.35)	0.039*** (2.59)	0.036*** (2.62)	0.009 (0.91)
Employer Contr.	-0.000 (1.51)	-0.000 (1.47)	-0.000 (1.21)	-0.000 (0.84)	-0.000 (0.65)	0.000 (0.16)
Participation Rate	0.000*** (3.27)	0.000*** (3.00)	0.000 (0.40)	0.001*** (2.60)	0.001** (2.37)	0.000 (1.30)
Log(Plan Age)	0.001 (0.07)	0.012 (1.18)	0.019 (0.85)	0.020 (0.85)	0.008 (0.44)	-0.000 (0.02)
Mutual Funds	0.000*** (4.66)	0.000*** (4.66)	0.001*** (3.93)	0.000*** (2.75)	0.000 (1.26)	0.000 (0.66)
Constant	0.267*** (6.38)	0.234*** (5.55)	0.364*** (4.20)	0.212** (2.41)	0.167** (2.16)	0.165*** (2.97)
Adj. R-Square	0.700	0.701	0.686	0.650	0.655	0.681
N	144316	144316	34867	36019	36664	36766
Panel B: Marginal effects						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full	Full				
	Sample	Sample	Q1	Q2	Q3	Q4
Change for Small Plans		-0.043***				
P-value		[0.000]				

Panel A of this table presents linear models where the dependent variable is the total compensation paid scaled by plan assets. The models all control for plan fixed effects. Columns (1) and (2) estimate the model for the full sample, and columns (3) through (6) partition the sample by pre 2012 size quartiles. Small Plan is an indicator variable that takes a value of one if the plan has average assets below the sample median prior to 2012. Panel B presents the marginal effects for the relevant interaction terms. Absolute values of t-statistics are in parentheses, p-values are in brackets, and standard errors are clustered by plan. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-5. Mutual Fund Summary Statistics.

Panel A: Share Class Sample							
	Mean	Std. Dev.	P25	Median	P75	Observations	
Post Disclosure	0.38	---	---	---	---	2,018,682	
Non-Retail	0.12	---	---	---	---	2,018,682	
Non-Zero 12b-1	0.99	---	---	---	---	2,018,682	
Actual 12b-1 Fee (%)	0.56	0.35	0.25	0.50	1.00	2,018,682	
Expense Ratio (%)	1.46	0.63	1.03	1.45	1.88	2,018,682	
Net Flow (wins.) (%)	0.46	8.44	-2.17	-0.50	1.49	2,018,682	
Monthly Return (%)	0.51	4.13	-0.90	0.46	2.27	2,018,682	

Panel B: Fund-Level Sample							
	Mean	Std. Dev.	P25	Median	P75	Observations	
Post Disclosure	0.33	---	---	---	---	532,950	
Lag Actual 12b-1 (%)	0.41	0.20	0.25	0.37	0.51	532,950	
Lag Expense Ratio (%)	1.39	1.39	1.39	1.39	1.39	532,950	
Lag Net Flow (%)	2.03	215.21	-1.74	-0.54	1.10	532,950	
Lag Monthly Return (%)	0.60	4.43	-1.16	0.66	2.77	532,950	

This table presents summary statistics for the mutual fund samples used in our analysis. The data is constructed from the CRSP Survivorship-Free Mutual Fund database from 2003 to 2016. Panel A presents the summary statistics at the share class level, while Panel B presents summary statistics at the fund level. Fund level observations are constructed by value-weighting across lagged total net assets in the prior month.

Table 3-6. Mutual Fund Flows in a Triple Difference Setting.

	(1) Indicator 12b-1	(2) Indicator 12b-1	(3) Continuous 12b-1	(4) Continuous 12b-1
Post Disclosure	-1.440 *** (9.272)	-3.284 *** (20.705)	-0.593 *** (24.268)	-2.186 *** (56.623)
Fee	-0.656 *** (5.843)	-0.981 *** (8.728)	-1.298 *** (58.352)	-1.369 *** (61.501)
Non-Retail	-0.638 (0.939)	-0.699 (1.030)	1.027 *** (18.187)	1.036 *** (18.352)
Post x Fee	0.992 *** (6.363)	1.333 *** (8.553)	0.107 *** (2.970)	0.160 *** (4.445)
Post x Non-Retail	1.014 (1.048)	1.083 (1.121)	-0.467 *** (5.525)	-0.474 *** (5.613)
Non-Retail x Fee	3.122 *** (4.593)	3.318 *** (4.886)	2.888 *** (24.321)	3.176 *** (26.758)
Post x Non-Retail x Fee	-2.638 *** (2.724)	-2.835 *** (2.931)	-2.497 *** (14.326)	-2.777 *** (15.945)
Lag Return	9.206 *** (64.460)	9.466 *** (63.752)	9.183 *** (64.390)	9.413 *** (63.488)
Constant	0.562 *** (3.632)	1.848 *** (11.796)	0.637 *** (5.939)	1.675 *** (15.278)
Fixed Effects	Objective	Obj / Year	Objective	Obj / Year
Adj. R-Square	0.012	0.014	0.014	0.016
Observations	2,018,682	2,018,682	2,018,682	2,018,682

This table presents ordinary least squares regressions of mutual fund flows in a triple difference setting. The dependent variable is the net flow to a given share class expressed in percent and winsorized at the 1% and 99% levels to reduce the impact of extreme outliers. The post disclosure indicator variable is defined as 0 for months taking place prior to 2012 and 1 for months taking place during or after 2012. In columns (1) and (2), the fee variable is defined as an indicator variable if the share class has a 12b-1 fee greater than 0, while in columns (3) and (4), the continuous measure of the 12b-1 fee is used. The non-retail indicator variable is identified using Regular Expressions, where text patterns in share class names are used to identify the targeted clientele. Interaction terms for each of these three indicator variables is included, as is the lagged monthly return of the share class as a control. Fixed effects indicated in their respective columns are included but not displayed. T-statistics are presented in parentheses and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-7. Multinomial Logit of Share Class Creation.

	(1) Retail/Higher 12b-1	(2) Retail/Lower 12b-1	(3) Non-Retail/Higher 12b-1	(4) Non-Retail/Lower 12b-1
Post Disclosure	-1.045 *** (-10.019)	-0.587 *** (-9.340)	-0.990 *** (-7.900)	0.152 *** (3.528)
Lag Flow Percent	0.002 (0.243)	-0.061 (-0.554)	-0.001 (-0.026)	-0.014 (-0.285)
Lag Return	0.256 (0.317)	-2.911 *** (-5.499)	-0.834 (-0.835)	-0.516 (-1.087)
Lag Actual 12b-1	-206.124 *** (-8.722)	86.466 *** (5.985)	-115.128 *** (-3.921)	110.247 *** (9.352)
Lag Expense Ratio	4.664 (0.622)	-18.374 ** (-3.232)	-28.293 ** (-2.684)	-28.352 *** (-6.049)
Constant	-5.678 *** (-55.129)	-5.781 *** (-76.274)	-5.983 *** (-46.384)	-5.518 *** (-88.630)
Observations	532,950			
Pseudo R-Squared	0.009			
Post Disc = 0	0.00156	0.00330	0.00105	0.00418
Post Disc = 1	0.00055	0.00184	0.00039	0.00488
Marginal Effect (eval. at means)	-0.00101 *** (12.02)	-0.00146 *** (10.38)	-0.00066 *** (9.42)	0.00070 *** (3.51)

This table presents a multinomial logit analysis on share class creation. The unit of observation is the fund-month, with the base outcome defined as “no new share class created”. Apart from the base outcome, four unique outcomes are defined, consisting of the interaction of a non-retail indicator variable and 12b-1 indicator variable. The non-retail indicator variable is identified using Regular Expressions, where text patterns in share class names are used to identify the targeted clientele. The 12b-1 interaction variable captures whether the newly created share class has a higher 12b-1 fee than the value-weighted fund average 12b-1 fee in the month prior to creation. The outcome of interest is specified at the header of each column, with column 4 (the creation of a non-retail share class with a lower 12b-1 fee) of particular interest for our research question. Control variables are measured at the fund-level in the prior month, where individual share classes are value-weighted by their respective total net assets. In the second panel, marginal effects are presented, with the values of all covariates except for the post disclosure indicator evaluated at their means. T-statistics are presented in parentheses and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-8. Mutual Fund Flows in a Triple Difference Setting Placebo Tests.

	(1) 2009	(2) 2010	(3) 2011	(4) 2012	(5) 2013
Post Disclosure	-0.169 (0.631)	0.419 ** (2.004)	-1.245 *** (6.987)	-1.283 *** (7.731)	-1.285 *** (7.795)
Fee	-0.562 ** (2.300)	-0.013 (0.070)	-0.966 *** (7.003)	-0.909 *** (7.713)	-0.848 *** (7.599)
Non-Retail	1.425 (1.254)	0.872 (0.930)	-0.752 (0.970)	-0.970 (1.401)	-1.176 (1.614)
Post x Fee	-0.241 (0.896)	-0.724 *** (3.456)	0.980 *** (5.474)	1.199 *** (7.187)	1.209 *** (7.292)
Post x Non-Retail	-2.930 ** (2.166)	-2.086 * (1.790)	0.466 (0.441)	1.433 (1.407)	1.925 * (1.804)
Non-Retail x Fee	1.868 (1.642)	1.981 ** (2.112)	3.169 *** (4.082)	2.953 *** (4.260)	2.750 *** (3.771)
Post x Non-Retail x Fee	1.200 (0.887)	0.426 (0.366)	-1.963 * (1.855)	-2.571 ** (2.522)	-2.650 ** (2.482)
Lag Return	7.636 *** (44.290)	7.544 *** (44.141)	7.262 *** (42.736)	6.868 *** (40.916)	8.505 *** (46.505)
Constant	-0.106 (0.382)	-0.450 ** (2.011)	0.422 ** (2.136)	0.400 ** (2.112)	0.428 ** (2.241)
Fixed Effects	Objective	Objective	Objective	Objective	Objective
Adj. R-Square	0.015	0.013	0.012	0.009	0.009
Observations	1,149,885	1,170,579	1,191,617	1,209,850	1,215,868

This table presents ordinary least squares regressions of mutual fund flows in a triple difference setting using placebo event years. The dependent variable is the net flow to a given share class expressed in percent and winsorized at the 1% and 99% levels to reduce the impact of extreme outliers. In each column, the post disclosure indicator variable is defined relative to the placebo year listed in the column header, with post disclosure defined as 0 for months taking place prior to the placebo event year and 1 for months taking place during or after the placebo event year. These regressions are run in a balanced manner, with eight years of monthly observations centered on the placebo event year (t-4 to t+3). The fee variable in these regressions is an indicator variable indicating if the 12b-1 fee at the share class level is greater than 0, mimicking the specification from column (1) in Table 6. The non-retail indicator variable is identified using Regular Expressions, where text patterns in share class names are used to identify the targeted clientele. In all columns, objective fixed effects are included but not displayed. T-statistics are presented in parentheses and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-9. Multinomial Logit of Share Class Creation Placebo Tests.

	(1) 2009	(2) 2010	(3) 2011	(4) 2012	(5) 2013
Post Disclosure	-0.116 * (-2.180)	0.162 ** (3.117)	0.428 *** (7.960)	0.577 *** (10.626)	-0.012 (-0.220)
Lag Flow Percentage	-0.016 (-0.228)	-0.025 (-0.298)	-0.058 (-0.510)	-0.027 (-0.313)	-0.017 (-0.221)
Lag Return	-0.327 (-0.605)	-0.435 (-0.822)	-1.319 * (-2.414)	-0.933 (-1.651)	-0.783 (-1.202)
Lag Actual 12b-1	115.248 *** (7.792)	94.574 *** (6.270)	61.287 *** (3.844)	44.000 ** (2.688)	49.080 ** (2.783)
Lag Expense Ratio	-26.537 *** (-4.495)	-22.633 *** (-3.879)	-16.213 ** (-2.712)	-15.092 * (-2.503)	-24.380 *** (-3.757)
Constant	-5.434 *** (-66.601)	-5.502 *** (-68.653)	-5.628 *** (-68.188)	-5.638 *** (-68.146)	-5.308 *** (-63.138)
Observations	322,544	320,285	316,430	310,079	299,873
Pseudo R-Squared	0.007	0.006	0.009	0.010	0.008
Post Disc = 0	0.00476	0.00430	0.00361	0.00341	0.00425
Post Disc = 1	0.00425	0.00506	0.00554	0.00606	0.00421
Marginal Effect (eval. at means)	-0.00051 ** (2.14)	0.00076 *** (3.14)	0.00193 *** (7.96)	0.00266 *** (10.59)	-0.00004 (0.18)

This table presents multinomial logit analyses on share class creation using placebo event years. In each column, the post disclosure indicator variable is defined relative to the placebo year listed in the column header, with post disclosure defined as 0 for months taking place prior to the placebo event year and 1 for months taking place during or after the placebo event year. These regressions are run in a balanced manner, with eight years of monthly observations centered on the placebo event year (t-4 to t+3). Coefficients are presented only for the creation of non-retail share classes with lower 12b-1 fees, omitting outcomes referring to other types of share classes for brevity. Control variables are measured at the fund-level in the prior month, where individual share classes are value-weighted by their respective total net assets. In the second panel, marginal effects are presented, with the values of all covariates except for the post disclosure indicator evaluated at their means. T-statistics are presented in parentheses and statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

Table 3-10. Summary Statistics of Hand-Matched Random Sample.

	<u>Full Sample</u>			<u>Hand Matched Sample</u>		
	Pre	Post		Pre	Post	
<u>Plan Characteristics</u>						
Avg. Assets (in \$mn)	49.73	67.31	***	28.86	35.88	
No. Participants w. Accounts	858.60	930.83	**	523.93	527.27	
Employer Contr. (in %)	24.15	25.02	***	25.05	26.03	
Participation Rate (in %)	70.09	70.66	***	70.26	73.00	
Mutual Funds (in %)	60.73	64.78	***	74.35	77.73	
Plan Age (in Years)	19.47	22.32	***	20.23	22.67	*
<u>All Compensation Paid</u>						
Admin Exp. to Assets (in %)	0.25	0.24	***	0.20	0.25	*
Direct Comp. to Assets (in %)	0.22	0.22		0.17	0.24	**
Indirect Comp. to Assets (in %)	0.09	0.06	***	0.10	0.07	
Total Comp. to Assets (in %)	0.31	0.28	***	0.27	0.32	
Indirect Comp. Paid	0.67	0.70	***	0.79	0.86	
Indirect Comp. Formula Only	0.40	0.41	***	0.39	0.40	
Ind. to Total Comp. (in %) (1)	17.38	15.04	***	27.47	21.24	
Ind. to Total Comp. (in %) (2)	32.13	27.82	***	47.64	36.99	*
<u>Plan Menu Characteristics</u>						
Mean Expense Ratio (%)				0.80	0.70	***
Fraction Low Cost Funds				0.18	0.24	**
No. Low Cost Funds				4.26	5.94	***
No. Investment Options				23.35	24.87	
No. Mutual Funds				20.34	21.86	
No. Plan Years	70553	73763		160	168	
No. Plans	39519	39519		105	105	

This table presents summary statistics for the pension plans in our sample based on Form 5500 data obtained from the DOL as well as for our random sample of plan menus from Schedule H. Columns (1) and (2) report the mean values for the full sample prior to 2012 and post 2012, respectively. Columns (3) and (4) present the corresponding mean values for the random sample. The difference in means between the two time periods is based on a t-test assuming unequal variances. We use * **, and *** to denote that the difference is significantly different from zero at the 10%, 5%, and 1% level, respectively.

Table 3-11. Changes in Retirement Plan Investment Options.

	(1)	(2)	(3)
	Mean Expense Ratio	No. Low Cost Funds	Fraction Low Cost Funds
Post 2012	-0.090*** (4.39)	1.443** (2.51)	0.050** (2.34)
Log(Avg. Assets)	-0.021 (0.58)	0.193 (0.19)	-0.021 (0.49)
Log(Participants)	-0.013 (0.43)	0.829 (1.02)	0.055 (1.64)
Employer Contr.	-0.001 (0.59)	0.004 (0.19)	0.000 (0.12)
Participation Rate	0.001 (0.97)	-0.009 (0.45)	-0.000 (0.42)
Log(Plan Age)	-0.004 (0.13)	0.303 (0.40)	0.021 (0.71)
Mutual Funds	-0.001** (2.06)	0.048*** (3.16)	0.002*** (2.71)
Size Quintiles	Yes	Yes	Yes
2-Digit NAICS FE	Yes	Yes	Yes
Adj. R-Square	0.246	0.163	0.195
N	328	328	328

This table presents linear models of the changes in retirement plan investment options following 2012 for our random sample of hand-matched plans. In column (1) the dependent variable is the mean expense ratio of all mutual funds on a plan. In column (2) the dependent variable is the number of low cost options on a plan. In column (3) the dependent variable is the fraction of low cost options relative to all investment options on the plan menu. All models include plan size fixed effects based on pre 2012 size quartiles and 2-digit NAICS industry fixed effects. Standard errors are clustered by plan and absolute values of t-statistics are in parentheses. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% level, respectively.

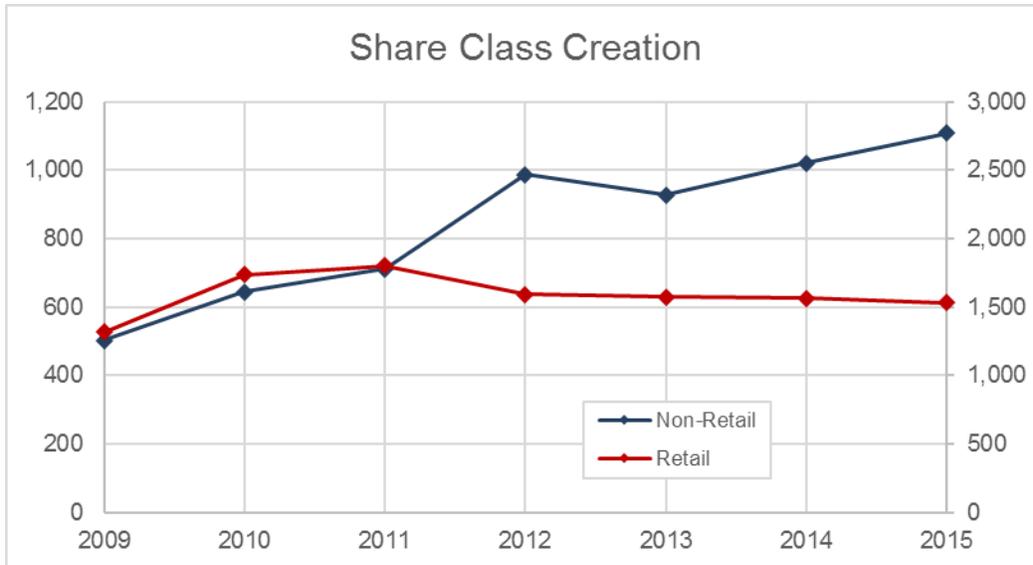


Figure 3-1. Time Series of Share Class Creation. Mutual fund share classes in the CRSP Survivorship-Free Mutual Fund Database are assigned a type using Regular Expressions. Text patterns in share class names are used to classify the target clientele of share classes as either retail or non-retail, where non-retail share classes include both retirement and institutional target audiences. In each calendar year, share class initiations are aggregated within each type. The time series of share class creations is plotted from 2009 to 2015, with non-retail share classes plotted against the left axis and retail share classes plotted against the right axis.

CHAPTER 4 CONCLUSION

One of the largest investment vehicles available to investors, both retail and institutional, is mutual funds. In this dissertation, we examine various research questions related to performance and fees charged in the mutual fund industry, as well as how compensation from mutual funds to retirement plan service providers responds to more salient and mandatory disclosure.

In the first part of this dissertation, we analyze whether the personal consumption habits of mutual fund managers are related to the performance of their funds. This idea builds upon literature that asks how the personality traits and private decisions of asset managers can be used to infer their performance at work. Overall, the results of Chapter 2 suggest that decisions made in the personal lives of mutual fund managers can serve as important signals for fund investors. Specifically, we find that authentic managers, with personal consumption habits that match their fund objective, outperform hypocrite managers, whose personal consumption habits do not match the fund objective. The outperformance observed among authentic managers is also concentrated among their environmental holdings, suggesting that familiarity or “dedication to the cause” of social responsibility may be driving this relationship. Our findings are robust to various controls for systematic risk and we are able to successfully rule out alternative explanations.

The second part of this dissertation diverges from a strictly mutual fund question and asks about revenue sharing payments from investment fund providers to service providers of defined contribution retirement plans. We show that in the presence of more salient disclosure, the indirect payments between mutual funds and service

providers decline, the direct compensation paid to advisors increases, and the proportion of indirect compensation declines. Furthermore, we demonstrate that total compensation declines among all but the largest plans in our sample, consistent with the notion that indirect compensation facilitates price discrimination prior to 2012. Our results indicate that more salient disclosure of indirect fees, imposed by the Department of Labor in 2012, serves to mitigate this price discrimination. We also show that the additional disclosures caused shifts in the aggregate mutual fund industry, with an increased likelihood of creating low fee share classes targeted to retirement investors, and a shift of mutual fund flows away from revenue sharing share classes. This research is not only of academic interest, in the sense of building upon the disclosure literature and providing an empirical test of recent theoretical work, but also an important study for today's policymakers, with the Department of Labor, the Government Accountability Office, and the Securities and Exchange Commission expressing interest in recent years. Given the widespread recognition that fees can rapidly erode plan performance, and the importance of providing transparent vehicles for individuals to save for retirement, we show an instance in which salient disclosure serves as an effective policy tool to reduce indirect payments to service providers.

LIST OF REFERENCES

- Agarwal, S., Chomsisengphet, S., Mahoney, N., Stroebel, J., 2015. Regulating Consumer Financial Products: Evidence from Credit Cards. *The Quarterly Journal of Economics*. 130(1), 111-164.
- Anginer, D., Statman, M., 2010. Stocks of Admired and Spurned Companies. *Journal of Portfolio Management*. 36, 71–77.
- Ausubel, L., 1991. The Failure of Competition in the Credit Card Market. *The American Economic Review*, 50-81.
- Ayres, I., Curtis, Q., 2014. Beyond Diversification: The Pervasive Problem of Excessive Fees and Dominated Funds in 401(k) Plans. *Yale Law Journal*, 124, 1476-1552.
- Bertrand, M., Morse, A., 2011. Information Disclosure, Cognitive Biases, and Payday Borrowing. *The Journal of Finance*, 66(6), 1865-1893.
- Bradley, D., Gokkaya, S., Liu, X., 2016. Before an Analyst Becomes an Analyst: Does Industry Experience Matter? *Journal of Finance*. Accepted Article.
- Brown, S., Lu, Y., Ray, S., Teo, M., 2017. Sensation Seeking, Sports Cars, and Hedge Funds. Working Paper.
- Busse, J., Jiang, L., Tang, Y. (2017). Double-Adjusted Mutual Fund Performance. Working Paper.
- Carhart, M., 1997. On Persistence in Mutual Fund Performance. *Journal of Finance*. 52, 57–82.
- Cohen, L., Schmidt, B., 2009. Attracting Flows by Attracting Big Clients. *The Journal of Finance*, 64(5), 2125-2151.
- Coval, J., Moskowitz, T., 1999. Home Bias at Home: Local Equity Preference in Domestic Portfolios. *Journal of Finance*. 54, 2045-2073.
- Da, Z., Engelberg, J., Gao, P., 2011. In Search of Attention. *Journal of Finance*. 66, 1461–1499.
- Derwall, J., Guenster, N., Bauer, R., Koedijk, K., 2005. The Eco-Efficiency Premium Puzzle. *Financial Analysts Journal*. 61, 51–63.
- Edmans, A., 2011. Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*. 101, 621–640.
- Fabozzi, F., Ma, K., Oliphant, B.J., 2008. Sin Stock Returns. *Journal of Portfolio Management*. 35, 82–94.

- Finkelstein, A., 2009. E-ztax: Tax salience and tax rates. *The Quarterly Journal of Economics*, 124(3), 969-1010.
- Fornell, C., Mithas, S., Morgeson, F. V., Krishnan, M.S., 2006. Customer Satisfaction and Stock Prices: High Returns, Low Risk. *Journal of Marketing*. 70, 3–14.
- French, K., Poterba, J., 1991. Investor Diversification and International Equity Markets. *American Economic Review*. 81, 222-226.
- Gabaix, X., Laibson, D., 2006. Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets. *The Quarterly Journal of Economics*, 121(2), 505-540.
- Graham, J., Harvey, C., Popadak, J., Rajgopal, S., 2017. Corporate Culture: Evidence from the Field. Working Paper.
- Government Accountability Office, 2011. Improved Regulation Could Better Protect Participants from Conflicts of Interest. Report to the Ranking Member, Committee on Education and the Workforce, House of Representatives.
- Government Accountability Office, 2012. Increased Educational Outreach and Broader Oversight May Help Reduce Plan Fees. Report to Congressional Requestors.
- Hamilton, S., Jo, H., Statman, M., 1993. Doing Well While Doing Good? The Investment Performance of Socially Responsible Mutual Funds. *Financial Analysts Journal*. 49, 62–66.
- Hochberg, Y., Rauh, J., 2013. Local Overweighting and Underperformance: Evidence from Limited Partner Private Equity Investments. *Review of Financial Studies*. 26, 403–451.
- Hong, H., Kacperczyk, M., 2009. The price of sin: The effects of social norms on markets. *Journal of Financial Economics*. 93, 15–36.
- Investment Company Institute, 2016. The Economics of Providing 401(k) Plans: Services, Fees, and Expenses 2015. ICI Research Perspective.
- Inderst, R., Ottaviani, M., 2012. Financial Advice. *Journal of Economic Literature*, 50(2), 494-512.
- Inderst, R., Ottaviani, M., 2012. How (not) to Pay for Advice: A Framework for Consumer Financial Protection. *Journal of Financial Economics*, 105(2), 393-411.
- James, C., Karceski, J., 2006. Investor Monitoring and Differences in Mutual Fund Performance. *Journal of Banking & Finance*, 30(10), 2787-2808.

- Kostovetsky, L., Ratushny, V., 2016. Returns to Specialization: Evidence from Health Mutual Fund Managers. Working Paper.
- Kristof-Brown, A., Zimmerman, R., Johnson, E., 2005. Consequences of individuals' fit at work: A meta-analysis of person-job, person-organization, person-group, and person-supervisor fit. *Personnel Psychology*.
- Miller, N., 2009. Strategic Leniency and Cartel Enforcement. *The American Economic Review*, 99(3), 750-768.
- Nanda, V., Wang, Z., Zheng, L., 2009. The ABCs of Mutual Funds: On the Introduction of Multiple Share Classes. *Journal of Financial Intermediation*, 18(3), 329-361.
- Pool, V. K., Sialm, C., Stefanescu, I. 2016. It Pays to Set the Menu: Mutual Fund Investment Options in 401(k) Plans. *The Journal of Finance*, 71(4), 1779-1812.
- Rudd, A., 1981. Social Responsibility and Portfolio Performance. *California Management Review*.
- Schenk, D., 2011. Exploiting the salience bias in designing taxes. *Yale Journal on Regulation*, 28, 253.
- Sirri, E., Tufano, P., 1998. Costly Search and Mutual Fund Flows. *The Journal of Finance*, 53(5), 1589-1622.
- Stango, V., Zinman, J., 2011. Fuzzy Math, Disclosure Regulation, and Market Outcomes: Evidence from Truth-in-Lending Reform. *The Review of Financial Studies*, 24(2), 506-534.
- Statman, M., 2000. Socially Responsible Mutual Funds. *Financial Analysts Journal*. 56, 30–39.
- Statman, M., Fisher, K., Anginer, D., 2008. Affect in a Behavioral Asset-Pricing Model. *Financial Analysts Journal*. 64, 20–29.
- Tesar, L., Werner, I., 1995. Home bias and high turnover. *Journal of International Money and Finance*. 14, 467–492.
- Thaler R., Sunstein C., 2008. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press.
- Wagner Law Group, 2014. Putting 408(b)(2) Disclosure Rules into Practice: A Guide for Plan Sponsors.
- Whitmarsh, L., O'Neill, S., 2010. Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology*. 30, 305–314.

BIOGRAPHICAL SKETCH

Charles grew up in Washington state, where he earned a Bachelor of Science in Business Administration, specializing in finance. He worked in the aerospace and defense industry for several years before joining the PhD program in finance at the University of Florida in the fall of 2012. Completing his PhD in the fall of 2017, Charles has accepted and begun working as an Associate at the economic consulting firm of Cornerstone Research in Boston, Massachusetts.