Fiduciary Duty and the Market for Financial Advice

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ABSTRACT. Fiduciary duty may combat principal-agent problems in the provision of financial advice, but it may also impose costs through legal liability. We study the effects of fiduciary duty on the deferred annuity market using transaction-level data. Leveraging state-level variation in common law fiduciary duty, we find that it raises risk-adjusted returns by 25 bp without decreasing transacted volume. We develop a model of entry and advice provision, which shows that fiduciary duty operates by directly constraining low-quality advice rather than by solely increasing compliance costs. Overall, results suggest that expanding fiduciary duty would improve investor welfare.

KEYWORDS. fiduciary duty, financial regulation, financial advice, retirement markets, annuities.

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I. Introduction

Informed agents working on behalf of uninformed principals are subject to fundamental conflicts of interest. The primary legal mechanism for bridging this principal-agent problem has historically been *fiduciary duty*. Agents subject to fiduciary duty must act in the best interest of their principals, including a duty of care that requires agents to exert effort on behalf of them, and a duty of loyalty that requires agents to put aside any opportunities for private benefit. If agents fail to satisfy their fiduciary duty, they can be liable for any losses the principals incur.

In the United States, policymakers are engaged in a debate about the merits of fiduciary duty in the context of retail financial advisers. State and national regulators have imposed fiduciary duty on only some financial advisers, and there have been calls for its expansion to all. In 2012, the Department of Labor proposed expanding fiduciary duties to all advisers selling retirement products, but the rule never went into effect due to legal challenges. Since then, various states have considered legislation that would impose fiduciary standards. In June 2019, the SEC passed Regulation Best Interest, which states that financial advisers may not subjugate investors' interests to their own.[1] Given Americans save almost $30 trillion for retirement, much of which is in complex financial products sold through advisers, it is unsurprising that industry and consumer advocacy groups have spent millions lobbying on this issue.

Supporters of expanding fiduciary duty argue that it alleviates conflicts of interest. According to this viewpoint, fiduciary duty contracts the market for high fee products that harm consumers and benefit advisers who take commissions. Opponents argue that fiduciary duty does not have an impact on product choice, perhaps because most investors using brokers already know which product to buy, because competition already disciplines financial advisers, or because conflicts of interest are minimal. Additionally, opponents argue that fiduciary duty raises the cost of doing business across the board, leading to fewer advisers in the market and perhaps to even worse advice in equilibrium.

[1]The stated goal of Regulation Best Interest was to harmonize the standards across all types of financial advisers. There is debate over whether this rule corresponds to fiduciary standards, and the SEC has yet to issue detailed guidelines at the time of this draft.

This paper evaluates these competing claims empirically using a new dataset of transaction-level data for deferred annuity sales from an anonymous financial services provider ("FSP"). FSP is within the top-five companies by market share of annuities and representative of other large companies in this industry. This dataset contains information about every contract sold by FSP from 2013–2015, detailed data about the product and adviser and some limited data on the client. Crucially, for each transaction we observe the fiduciary status of the adviser and granular geographic information about the locations of the transacting parties. We supplement this data with hand-coded information about contract characteristics from SEC filings and open records requests. These contract terms are combined with data from Morningstar and CRSP about investment options within annuities. We aggregate these characteristics into a single valuation for each contract.

Our identification strategy leverages differences in fiduciary duty across types of advisers and across state borders. Advisers licensed as *registered investment advisers* (RIAs) have a fiduciary duty towards their clients at the national level, while those licensed as *broker-dealers* (BDs) do not. BDs are excluded from fiduciary duty because they historically have been considered order takers without a significant advisory function. Today, however, they do similar work with respect to retail investors (SEC, 2011, 2013a,b) and largely carry the same annuities at the same "prices" (fees, contract characteristics, etc.). Crucially, state courts in several states have ruled that BDs are fiduciaries within their borders, setting up common law variation in fiduciary standards. We compare behavior of BDs in states in which they have fiduciary duty to states in which they do not, using the difference in behavior of RIAs as a control. To control for differences across states, we restrict to counties along state borders at which there is a change in common law fiduciary standards.

Our difference-in-differences approach shows that state common law fiduciary duty improves investor welfare. Broker dealers facing fiduciary duty sell products with risk-adjusted returns that are 25 basis points higher. The increase in returns arises from a change in the set of transacted products. We find a shift towards fixed indexed annuities and away from variable annuities. Within variable annuities, sales shift towards those with more investment options, a larger variety of highly-rated investment options, and options with higher historical returns. Additionally, there is no loss to investors from a contraction in the size of the market, as the same number of contracts and total dollars are invested in annuity products. This is despite a 16% drop in the number of brokers providing financial advice, which we estimate from an additional dataset with information about all advisers who can sell annuities.

These results show that common law fiduciary duty has a positive impact on retail investors. We show that there are two mechanisms that can deliver this result: fiduciary duty may align incentives between agents and principals, or it may just impose fixed costs that happen to drive out low-quality advisers. Distinguishing between these two channels has important implications for policy. The effects of expanding fiduciary duty to markets outside the ones under study or increasing its stringency depend on which channel dominates.

To disentangle these two mechanisms, we develop a model of entry into the provision of financial advice with heterogenous adviser qualities and differentially regulated firms. Detractors of extending fiduciary duty to all BDs argue that it will increase the cost of doing business, regardless of advice quality. If this mechanism, which we call the *fixed cost channel*, dominates, then fiduciary duty will lead to exit of BDs and potentially to entry of RIAs. However, proponents argue that it will constrain advisers from providing low quality advice. We name this mechanism the *advice channel*. If this channel holds, some advisers will improve their advice, while others will find it unprofitable to remain in the market and will exit. Their exit may induce the entry of previously unprofitable advisers offering high-quality advice. Thus, a testable implication of an advice channel is the entry of BDs offering high-quality advice when extending fiduciary duty to all advisers. By leveraging the distribution of advice (proxied by returns) rather than simply its mean, we find evidence for the presence of a substantial advice channel.

Related Literature. Despite the importance of studying the impact of fiduciary duty, there has been limited empirical work on this topic. Using cross-state common law variation, Finke and Langdon (2012) find that fiduciary duty does not impact the number of BDs per household and that advisers report that it constrains the advice they give. Their estimates are noisy, however, and their comparisons are conducted across entire states. Our border strategy addresses the issue that states with fiduciary duty may be different in other dimensions; we are also able to directly observe transactions. Kozora (2013) considers a temporary change in the fiduciary standard for the municipal bond market and finds that stricter standards led to more sales of investment-grade bonds. Finally, Egan (2019) considers the impact of fiduciary duty in the reverse convertible bond market, documenting a high likelihood of purchase of dominated products. Through the lens of a search model, he estimates that extending fiduciary duty would increase risk-adjusted returns by 5–21 bp. In contrast, this paper focuses on the market for deferred annuities, a product that is mostly purchased as a vehicle for retirement savings and that has been directly mentioned by regulators as a source of concern. Additionally, our use of variation in common-law fiduciary duty allows us to identify its effects in the reduced form.

This paper is related to a broader literature on the market for financial advice. Theoretical work on financial advice has a long tradition (Inderst and Ottaviani, 2012a,b), and there is a growing body of recent empirical work on this issue. Egan et al. (2019) study the prevalance and geographic concentration of misconduct in this industry. Charoenwong et al. (2019) show that the agency in charge of enforcement affects quality, as proxied by complaints; we show that regulation itself affects outcomes, and we have direct observations of transacted products and use them to generate metrics of quality. In this paper we are agnostic about the potential recourse for offering suboptimal advice, but Kozora (2017) provides some evidence on this dimension by studying how properties of the product influence arbitration.

There is some debate in the academic literature on the extent of conflict-of-interest problems in financial settings. On the one hand, a number of papers have documented intermediaries responding to commissions and other incentives rather than offering clients appropriate advice.[2] In addition, a literature in finance has documented that mutual funds sold through brokers, rather than through direct sales, have lower returns and higher fees (Bergstresser et al. (2009), Christoffersen et al. (2013), del Guercio and Reuter (2014)). On the other hand, Linnainmaa et al. (2016) and Foerster et al. (2017) suggest that suboptimal advice may be due to

[2]See Anagol et al. (2017) for the context of life insurance, Mullainathan et al. (2012) for financial advisers, Dickstein (2016) for doctors, Guiso et al. (2018) for mortgages, Garrett (2019) for municipal bond underwriting, Hong (2018) and Barwick et al. (2017) for real estate, and Camara and Dupuis (2014) and DellaVigna and Hermle (2017) for movie reviews.

misconceptions about products rather than commissions. Our results show that equilibrium product choice is impacted by financial regulation targeting adviser conflicts of interest, suggesting both that brokers can improve investor returns through advice and that brokers in turn can be influenced by legal intervention.

We bring two main contributions to these literatures. First, we estimate the causal effects of extending common law fiduciary duty on product characteristics, returns, and market structure. Second, we show sufficient conditions for fiduciary duty to operate as a constraint on low-quality advice and document empirical evidence for this mechanism. This lends credence to the position that extending fiduciary duty to all BDs would ultimately result in higher returns for retail investors—even in markets other than the borders under study.

II. Institutional Details

In this section, we introduce the institutional setting. Section II.A discusses financial advisers in the US and how fiduciary standards have evolved. Section II.B discusses details of variable and fixed indexed annuities, the products we study in this paper.

II.A. Financial Advisers and Fiduciary Duty

The United States has two types of financial advisers, which evolved separately for historical reasons but now largely serve similar functions. Registered investment advisers (RIAs), are regulated at the federal level by the SEC under the Investment Advisers Act of 1940. Broker-dealers (BDs), were initially conceived as mere brokers, but have grown into the role of providing financial advice as well. They are subject to the Securities Exchange Act of 1934 and regulated by state law and by FINRA, a private industry regulator. RIAs must be affiliated with a brokerage firm to sell certain products, including annuities, and thus many such advisers are *dually registered* as broker-dealers and investment advisers. They are subject to fiduciary duty at the federal level on their advisory accounts. In our sample, all transacting advisers are either broker-dealers or dual registrants—as they are selling annuities—but we refer to them as BDs and RIAs nevertheless.

All financial advisers tend to perform many of the same functions when working with individuals. Their primary role is to recommend and facilitate the purchase of investment vehicles, which are issued by upstream financial services providers. Broker-dealers are typically paid by commission, receiving a payment from the upstream supplier from every sales while charging nothing directly to clients. Compensation schemes for RIAs tend to be a combination of commissions and a percentage of assets under management. Advisers who are compensated, even in part, on the basis of commissions have a conflict of interest: they have an incentive to recommend high-commission products over ones that may be cheaper for their clients. Moreover, informed advisers with uninformed clients may have no incentive to exert effort to maximize their client's value if clients cannot verify the quality of advice *ex post*.

The patchwork of federal, state, and private regulation overseeing adviser behavior attempts to combat this conflict of interest by imposing legal duties on advisers. All BDs nationwide have a federal duty to deal fairly with their customer and must recommend products that are "suitable," as per FINRA regulation. This requirement does not specify that BDs must prioritize the customer's best interest over their own, as long as the product they recommend satisfies FINRA's suitability rules.[3] BDs are also required to provide customers with each product's prospectus, which includes all technical details about the investment vehicle but is not easily understood by a layperson. Any dispute that arises over a BD's regulatory compliance is arbitrated through FINRA's private dispute resolution process. Other claims may be brought under state or federal law. Nationwide regulation of RIAs is more stringent. RIAs have fiduciary duty imposed on them by the SEC, which requires that the RIA entirely disregard their own interest and work in the best interest of their customer. RIAs may still take commissions, but must disclose the resulting conflict of interest to their customer.[4] If a customer has a dispute with an RIA, the customer may sue in state or federal court, or enter into FINRA arbitration or external private arbitration.[5]

Consumer groups and the SEC have long been troubled by the difference in

[3] See http://www.finra.org/industry/suitability.

[4] RIAs that recommend higher commission products must justify that recommendation by using proprietary SEC-approved software that validates recommendations and by drafting disclosures to clients, among other costly compliance measures.

[5] Arbitrability varies across claims and states, although, to our knowledge, not across adviser types. Some states will allow tort claims to be brought that are very similar in nature to arbitrable claims even when there are mandatory arbitration clauses in the contract between client and adviser.

regulatory standards across BDs and RIAs. Studies by the SEC (SEC, 2011, 2013a,b) have suggested that that consumers often do not realize that BDs have an incentive to sell high commission products. They also are unable to tell whether their financial adviser is technically classified as a BD or a RIA, and many assume that all advisers are fiduciaries. Motivated by these concerns, the SEC recommended that standards be harmonized, requiring all advisers dealing with retail investors to offer the best possible contract in the investor's interest. The DOL promulgated a rule in 2016 largely following the SEC recommendation.[6] The rule would place a fiduciary duty on BDs that handle retirement savings for retail investors and require all advisers to sell customers the best available contract for them. In addition, the DOL rule requires contracts between advisers and consumers that specify the fiduciary duty and allow consumers to bring class action lawsuits to enforce it. The financial adviser industry pushed back on this rule, claiming it would significantly increase compliance costs for BDs and raise the spectre of expensive class action litigation, potentially putting some BDs out of business (Kelly, 2017). Litigation ultimately caused the DOL rule to be delayed indefinitely.[7] In June 2019, the SEC passed a final rule clarifying the duties placed on both RIAs and BDs. "Regulation Best Interest" harmonizes the standards to which BDs and RIAs are held, and requires all advisers to act in the best interest of their consumers.[8] Debates continue regarding the effect of this rule, relative to a more traditional fiduciary duty approach (Bernard, 2019; Marsh, 2019).

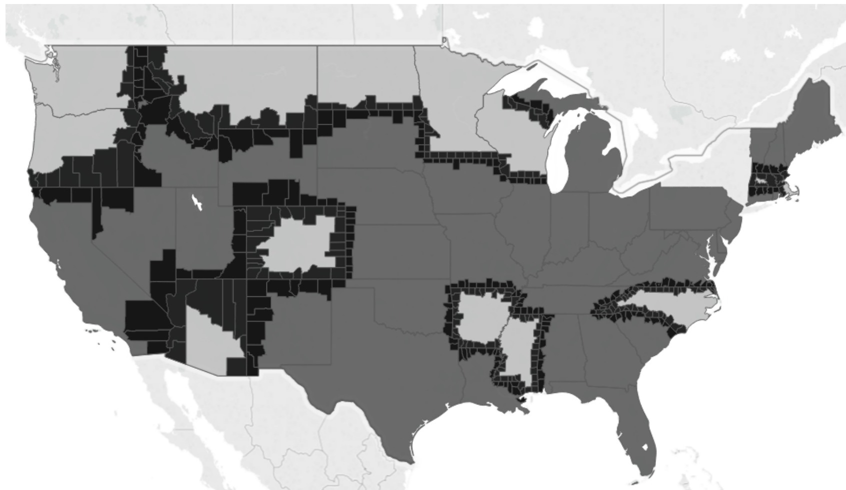
This project estimates the impact of imposing fiduciary duties on BDs leveraging cross-state variation in state common law. In some states, court rulings have imposed a common law duty of care that rises to the level of a fiduciary duty—a higher standard than required of BDs at the federal level. Finke and Langdon (2012) classify states into ones with no common law fiduciary duty on advisers and ones with some level of fiduciary duty; Figure 1 plots this classification. These duties

[6]See https://www.dol.gov/agencies/ebsa/laws-and-regulations/rules-and-regulations/completed-rulemaking/1210-AB32-2.

[7]The Fifth Circuit Court of Appeals vacated the DOL Rule in March 2018, stating the DOL had overstepped its regulatory authority. While the case may be appealed to the Supreme Court, it currently seems unlikely the DOL Rule will be resurrected. States have responded by imposing fiduciary duty through legislation, rather than common law.

[8]Clarifying guidance includes disclosure requirements and other documentation intended to ensure that consumers receive high quality advice. See https://www.sec.gov/rules/final/2019/34-86031.pdf.

Figure 1: Common law fiduciary duty on broker-dealers by state



States with some degree of fiduciary duty (dark grey) and none (light grey), per Finke and Langdon (2012). Counties in black are ones at borders between states with different fiduciary standards and consitute our main sample. New York, which does not impose common law fiduciary duty on its broker-dealers, and its surrounding counties are omitted, as New York has different suites of products.

allow clients to sue their financial advisers for low quality advice.[9] Since all RIAs already comply with uniform federal fiduciary duty standards, they provide a control against which to compare treated BDs (facing a fiduciary duty) relative to control BDs (facing only FINRA suitability rules). If fiduciary duty is effective, BDs will modify their behavior and their compliance programs, resulting in changes to their recommendations and to the investments made by their clients. Additionally, competitor behavior and market structure may be affected. Of course, states may not always be able to enforce these duties and common law may be less salient than legislation, suggesting that any estimate obtained by comparing state law regimes will likely be an underestimate of the impact of a federal rule.[10]

[9]Advisers who lie to their clients in a way that causes them material loss can always be sued for fraud or misrepresentation, under standard principles of tort law. Additional duties of care, including fiduciary duty, allow clients to recover losses sustained even when advisers have told clients the truth. This can occur when advisers suggest risky investments, “churn” across assets to increase their commissions, and otherwise do not tailor their advice to the needs of their client. For further discussion, see the Joint SEC/NASD Report (https://www.sec.gov/news/studies/secnasdvip.htm).

[10]Most state law fiduciary duty claims are brought by individual litigants, while statutory fiduciary duty claims could allow for more state enforcement actions and class actions.

II.B. Fixed and Variable Annuities

We restrict attention to annuities, one of the most common retirement vehicles with over $3 trillion in reserves. In addition to the size and importance of the annuity market, the DOL directly mentioned concerns about annuities as the impetus for their 2016 rule.[11] Most annuity contracts sold in the US are *deferred annuities*.[12] These products involve an accumulation phase, during which money is contributed to an account and invested, and a payout phase, during which payments are made from the account to the annuitant. Fixed indexed (FIA) and variable annuities (VA) are the most popular deferred annuity products. They share the structure of an accumulation and a payout phase, but differ in how the account grows during the accumulation phase, in the ways money can be withdrawn during both phases, in fee structure, and in the *riders*, or options, that can be added to the contract.

Investors in FIAs distribute their funds during the accumulation phase between a series of *crediting strategies*. Crediting strategies include fixed rates of return and the performance of the S&P 500, with a cap and a floor. All crediting strategies fully protect the investor from downside risk. In most cases, fees are not directly charged, so the client does not need to understand any further features of the product.[13] The main exception to this statement are *surrender charges*, which tax withdrawals taken in the first years of the accumulation period if they exceed a free withdrawal amount (typically 10% of contract value). Fixed indexed annuities can be converted into a fixed annuity once investors are sufficiently old, transitioning the contract into the payout phase; alternatively, they can be withdrawn. In the case of death during the accumulation period, beneficiaries receive the contract amount.

Variable annuities replace the small set of crediting strategies in FIAs with a pool of investment funds, with a wide range of asset allocations, risk profiles, and fees.

[11] The DOL stated that "[m]any other products, including various annuity products, among others, involve similar or larger adviser conflicts, and these conflicts are often equally or more opaque." It went on that the "greater degrees of complexity, mag-nif[ies] both investors' need for good advice and their vulnerability to biased advice." See https://www.federalregister.gov/documents/2016/04/08/2016-07924/definition-of-the-term-fiduciary-conflict-of-interest-rule-retirement-investment-advice.

[12] Fixed immediate annuities, in which investors turn over a lump sum in exchange for fixed periodic payments until death, are a very small fraction of the US annuity market.

[13] The margin comes from the the realized return of the index less the amount accrued.

The most basic VA contract resembles an FIA, with contract values accruing interest according to the performance of the set of funds chosen, and investors receiving the option of an annuity upon entering the payout phase. For this contract, investors pay an annual percentage fee, the expense ratios of the funds they invest in, and potentially surrender charges. Often, VA contracts are sold with *living benefit riders*, which establish a separate account called an *income base*, which for a fixed period of time grows by the maximum of the realizations of the fund return and a fixed rate. During the payout phase, clients choose between drawing down the account value, annuitizing it, or receiving a percentage of the income base in perpetuity. These riders essentially convert the VA into an option contract (Koijen and Yogo, 2018). This structure incentivizes risk-taking in fund selection. To mitigate this incentive, companies impose restrictions on the investment portfolio an annuitant can choose.

Optimal execution of VA contracts requires choosing appropriately from the pool of investment options, and if the contract is coupled with a living benefits rider, it further requires making correct decisions about when to take withdrawals. As a result, these contracts are more complex and difficult to value than a fixed indexed annuity. They also expose the annuitant to relatively more risk than FIAs do.

For annuities sold by FSP, there is no difference between BDs and RIAs in terms of the characteristics of the products they can choose to recommend. This implies both types of advisers can offer the same product with the same investment options and fees. A client choosing a particular product would have the same payout stream regardless of the adviser. What differs is how advisers are compensated by FSP.

III. Data and Empirical Strategy

In Section III.A, we describe the data provided to us by FSP about its transactions and the advisers that sell its products. Section III.B discusses data sources for the individual products in the dataset. Further details are in Appendix E.

III.A. Transactions, Advisers, and Clients

We have transaction-level data from a major financial services provider, FSP, which sells a mix of annuities and insurance products in all fifty states, has household name recognition, and is publicly traded. Our main dataset consists of information about all transactions associated with financial products offered by FSP in the United States between 2008 and 2015. For each transaction, we observe the specific FSP product transacted, the date, the adviser selling the product, and the dollar amount. If a contract involves multiple transactions, such as recurring payments, then they can be grouped together, and we report the sum of the transaction amounts. The only client-level information we have is the client's zipcode and age. Although clients can also be linked across contracts, clients purchasing multiple contracts is rare.

Additionally, FSP has provided us data from Discovery Data for all advisers who could potentially sell annuities or life insurance in 2015, regardless of whether they transact with the company. This dataset allows us to observe basic demographics of the adviser as well as regulatory information such as licensing and whether the adviser is registered as a BD, an RIA, or both. While advisers cannot be matched externally, we are able to match them to FSP transactions. Discovery also includes information about the firms, including the firm footprint (e.g., local or national). A drawback of the Discovery dataset is that since we only have a snapshot in 2015, we have to restrict our analysis to a window of time around this period to ensure the accuracy of each adviser's licensing information; we restrict to 2013–2015. Additional sample selection decisions are reported in Appendix E.2.

Table 1 provides summary statistics for FSP contracts sold in the border counties highlighted in Figure 1 and for the advisers associated with them. About 21% of advisers are BDs. BDs and RIAs each sell about 5.7 FSP contracts on average over the sample, with some advisers selling significantly more. Conditional on selling an FSP annuity, BDs and RIAs sell VAs 79% and 90% of the time, respectively. Contract amounts are about $34,000 larger for RIAs. Finally, the average client is around retirement age, with a difference of about 3 years between BD and RIA clients. Summary statistics for the entire nation are broadly similar; see Appendix B.1.

III.B. Product Characteristics

We match the transaction dataset to external data sources containing information about the products. Beacon Research has provided historical data about the all fees and investment options available to annuitants; this data is sourced for quarterly

Table 1: Summary statistics for border counties

				Percentiles				
	N	Mean	Std.	10%	25%	50%	75%	90%
Adviser-Level Quantities								
Is Broker-Dealer								
FSP Advisers	3,936	0.207						
Contracts per Adviser								
BD	814	5.7	9.2	1	1	2	6	14
RIA	3,122	5.7	9	1	1	3	6	14
Contract-Level Quantities								
Is Variable Annuity								
BD	4,678	0.793						
RIA	17,794	0.900						
Contract Amounts ($K, 2015)								
BD	4,678	119.4	139.8	24.2	42.6	79.9	148.6	251.5
RIA	17,794	153.0	179.7	34.3	54.4	100.9	188.2	304.1
Client Age								
BD	4,678	61.3	10.3	49	55	62	68	74
RIA	17,794	64.5	9.5	54	59	65	71	77

prospectuses that VAs are required to file with the SEC. We also hand collected information about restrictions on investments and rider rules from prospectuses stored in EDGAR, the SEC's online database. We match investment options to the Morningstar Investment Research Center to collect information about fund ratings and investment styles, and we match them to the CRSP US Mutual Fund database for historical returns.

Contract characteristics for transacted annuities are summarized in Table 2, separated by whether the adviser is a BD or an RIA. Panel (A) shows historical undiscounted returns (net of expense ratios) of the underlying investment options, assuming either the return-maximizing allocation (subject to investment restrictions) or an equal allocation across funds (Benartzi and Thaler, 2001). Panel (B) shows the minimum and average expense ratio of all potential investments. Panel (C) shows the mortality and expense fee, an annual percentage fee that must be paid on all products, along with the average surrender charge over the surrender schedule—which must be paid only if money is withdrawn early.[14]

[14]The surrender charge varies by year since the purchase of the contract, and it declines to zero within

Table 2: Summary statistics for annuities sold by BDs and RIAs, border counties

Characteristic	BD Mean	BD Std.	RIA Mean	RIA Std.
(A) Fund Return (%)				
Return-Maximizing	0.152	0.088	0.160	0.087
Equal	0.011	0.011	0.012	0.010
(B) Fund Expense Ratios (%)				
Minimum	0.503	0.022	0.500	0.020
Average	1.270	0.213	1.261	0.198
(C) Fees				
M&E Fee (%)	1.189	0.215	1.064	0.305
Surrender Charge (%)	3.737	1.197	2.963	1.436
(D) # Funds				
All	97.52	37.56	96.65	33.49
High Quality	27.39	12.63	33.12	14.09
Low Quality	34.74	17.24	30.57	19.06
(E) # Equity Styles				
Some High Quality	6.85	2.05	7.30	1.94
Only Low Quality	1.03	1.75	0.83	1.62
(F) # FI Styles				
Some High Quality	4.05	1.05	4.49	1.57
Only Low Quality	3.05	0.30	3.02	0.25
(G) Contract Return (all products)				
Risk-adjusted	0.031	0.012	0.027	0.010
Unadjusted	0.064	0.021	0.064	0.023

Panels (A)–(F) summarize characteristics of transacted VAs. Panel (G) summarizes characteristics of all transacted annuities. In Panel (D), "High Quality" refers to funds rated by Morningstar as 4 or 5 stars, and "Low Quality" refers to funds rated as 1 or 2 stars. In Panels (E) and (F), "Some High Quality" refers to styles covered at least by one high quality fund, and "Only Low Quality" refers to styles convered only by low quality funds.

Panels (D)–(F) are measures of the potential for diversification. We also report quality metrics for the underlying funds provided by Morningstar. Morningstar rates each fund on a scale of 1–5 stars based on its historical risk-adjusted return (net of expenses) relative to a peer group of funds. A fund is labeled *high-quality* if it receives at least 4 stars and *low-quality* if it receives 2 or fewer. Second, Morningstar

ten years. We average the surrender charges over this period (averaging in zeros if needed).

categorizes the *style* of both the equity and fixed-income investment of each fund into nine potential styles. Panel (D) counts the number of distinct investment options available per product, unconditionally and across quality levels. Panels (E) and (F) report the number of equity and fixed-income styles that are covered by at least one high-quality fund, as well as the number only covered by low-quality funds.

Table 2 shows that the variation across BDs and RIAs is small relative to the variation within adviser category. Given this heterogeneity, there is scope for advice to materially affect client outcomes and thus for regulation that shifts advice to have an impact. These characteristics may affect the return of the annuity, which we report in Panel (G). We discuss the procedure to calculate this return in Section III.C.

While FIAs do not have to file product characteristics with the SEC, we have collected archived rate sheets for these annuities through a series of open records requests to state insurance agencies. Beacon Research provides further information about them. Unfortunately, rates depend on the crediting strategies available in an FIA, so we do not have simple summary characteristics for FIAs like we do for VAs. However, we fold these rates into the return calculations.

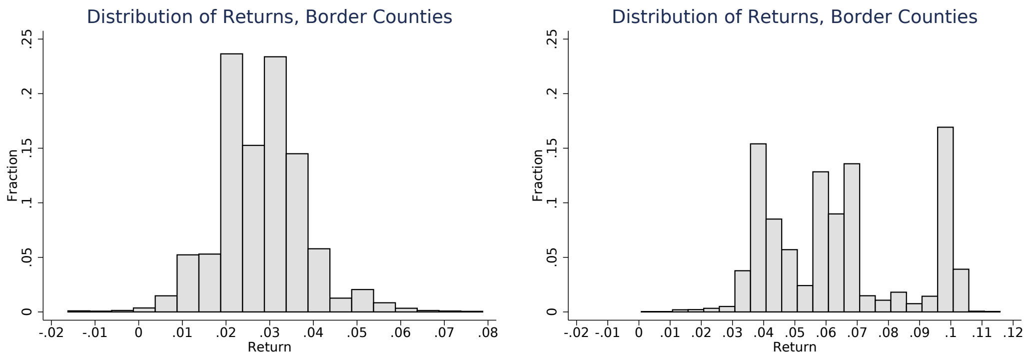
III.C. Calculating Net Returns

We aggregate contract characteristics into returns using two methods. Our preferred metric computes risk-adjusted returns, using a stochastic discount factor corresponding to a three-factor model (Cochrane, 2009). We also compute unadjusted returns, as they may align more closely with the information given to retail investors; del Guercio and Reuter (2014) shows that unsophisticated investors are more likely to follow unadjusted returns when investing in mutual funds.

We compute returns of each annuity in an environment where the annual risk-free rate is 3%, for an individual who values money left to heirs equally as her own consumption. Computing the expected net present value of these products requires (i) information about the fees of the basic contract and all riders, (ii) expectations over the distribution of returns for all underlying funds in which the annuitant can invest, (iii) a stance on the discount rates, and (iv) an understanding of portfolio allocations (for a VA) or crediting strategies (for an FIA) and how the annuitant chooses whether and when to take the rider. This information, together with age and contract amount,

Figure 2: Distribution of returns, border counties

(a) Risk-adjusted (b) Unadjusted



generates a net present value for each transaction. For interpretation, we present values as the annualized returns necessary in a fixed account to achieve the same net present value by the terminal age of the contract.[15]

As discussed above, we have fees and rate sheets, which directly deals with (i). We proxy (ii) using a Fama-French three-factor model for the underlying mutual funds, estimated using the historical distribution of returns from CRSP. We deal with (iii) discounting in two ways: for adjusted returns, we compute the stochastic discount factor that prices the factors and use this quantity to discount various states of the world. Alternatively, we compute returns for an individual who discounts all states of the future at 3%. Finally, given that a limitation of our dataset is that we do not see portfolio allocations of clients or execution of the riders, we tackle (iv) by formulating and solving the dynamic programming problem to find optimal execution of portfolio allocation or crediting strategy decisions, withdrawal decisions, and rider execution. Details of the factor model and discounting are in Appendix C, and an exposition of the dynamic program is in Appendix D.

Panel (G) of Table 2 shows that average returns of transacted products are slightly higher for BDs than RIAs. Figure 3 shows the full distribution of returns,

[15]That is, we find the return R such that

$$(1+\beta)^{T-A} \cdot \text{(Net Present Value)} = (1+R)^{T-A} \cdot \text{(Transaction Amount)}\,,$$

where A is age, $\beta = 3\%$ is the discount rate, and T is the terminal age of the contract.

which vary highly across products. Risk adjusted returns for VAs and RIAs range largely between 0 and 6%, with long tails in either direction. Products in the mean of the distribution have risk adjusted returns of about 2.5%, meaning that client returns could potentially double if they were advised to invest in a different product. Similarly observations apply to the distribution of unadjusted returns.

III.D. Empirical Strategy

The simple comparison of product sales across legal regimes is tainted by the fact that fiduciary standards are not randomly assigned. For example, if preferences for financial instruments have influenced the adoption of fiduciary standards, then differences in product sales across states confounds the effect of fiduciary standards with differences in preferences. Instead, we think of fiduciary duty as an endogenous object that is the result of each state's judicial process. We address this issue in two steps. First, we restrict the analysis to counties on either sides of a border between states that differ in fiduciary status, since we expect that—and subsequently provide corroborating evidence for the fact that—border counties are similar to each other. Second, we compare the difference across the border for BDs to that for RIAs, leading to a difference-in-differences strategy. In particular, for a variety of outcomes Y_{ist}, we run the regression

$$\begin{aligned} Y_{ist} = \alpha_0 + \alpha_1 \cdot \mathbb{1}[\text{State has FD for BDs}]_s \cdot \mathbb{1}[\text{Adviser is BD}]_i \\ + \alpha_2 \cdot \mathbb{1}[\text{State has FD for BDs}]_s \cdot \mathbb{1}[\text{Adviser is RIA}]_i \\ + \alpha_3 \cdot \mathbb{1}[\text{Adviser is BD}]_i + \text{Border FE} + \text{Month FE} + \text{Age FE} + \epsilon_{ist}, \quad (1) \end{aligned}$$

where i represents an adviser, s a state, and t a transaction. We include border fixed effects to use only within-border variation, month-of-contract fixed effects to address any changes in product offerings and rates over time, and client age fixed effects.

Within (1), there are three objects of interest. First is the straightforward difference-in-differences estimator, $\alpha_1 - \alpha_2$ in this formulation. Under the null hypothesis that fiduciary duty has no equilibrium impact on market outcomes, we should estimate $\alpha_1 - \alpha_2$ to be zero. One may worry that counties on either side of a state border differ from each other, either in the underlying demand for financial products or the supply of financial advice. However, the difference-in-differences estimator should alleviate this concern: as long as market differences across state borders are equal for BDs and RIAs, we would still expect $\alpha_1 - \alpha_2$ to be 0. In the results below, we will reject that $\alpha_1 - \alpha_2 = 0$ for most outcomes of interest, suggesting that fiduciary duty has an equilibrium impact. Under the assumption that there are no spillover effects onto RIAs one can interpret this difference-in-difference estimate as the causal effect of fiduciary duty on BDs.

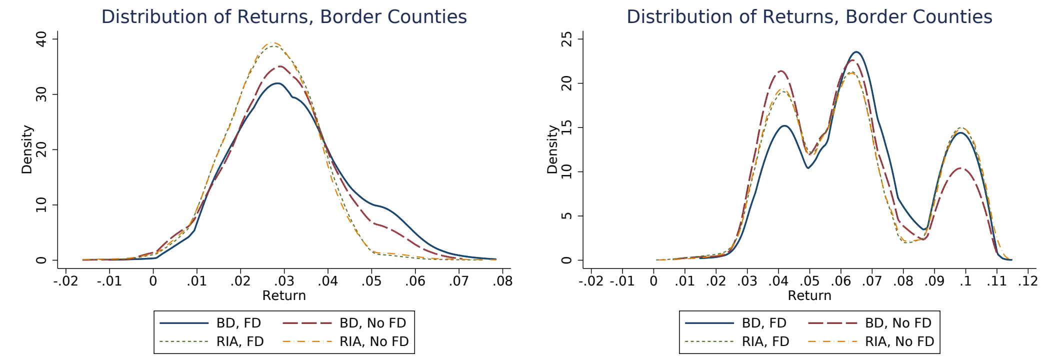
We also interpret α_1 and α_2 separately. Under the assumption that market conditions do not change sharply across the state border, α_1 alone is the causal impact of fiduciary duty on BDs, and α_2 can be interpreted as the spillover effect of BDs fiduciary duty onto RIAs. That is, interpreting both α_1 and α_2 as separate causal effects requires no shift in underlying market characteristics at the border.

The results show an effect of fiduciary duty on BDs, with α_1 being significantly different than zero for a variety of outcomes. However, we find no evidence of spillover effects on RIAs, with α_2 being economically and statistically zero for most outcomes. Moreover, we find limited evidence throughout for within-firm changes in the behavior of RIAs and on RIA entry.

We provide four arguments in favor of the assumption that underlying market characteristics do not change sharply at the state border. First, demographic characteristics are balanced across the border (Appendix B.2). Second, even with covariate balance, one may be worried about differential selection of consumers to advisers as a function of the fiduciary status of the state. However, there is extensive survey evidence (SEC, 2011, 2013a,b; Hung et al., 2008) suggesting that consumers have very little information about which type of adviser they visit. Of course, there can still be selection on observables—certain consumers may choose to visit large companies, which are more likely to have RIAs—but the extent of this selection would have to vary significantly across borders for this to be a legitimate concern. Third, one can test for differential selection by using client and contract characteristics as outcomes in (1). Table B.4 in Appendix B.2 shows no significant effects on transaction amount, client age, or incidence of cross-state shopping (i.e., whether the adviser and client are from the same state), providing more suggestive evidence against differential

Figure 3: Returns for border counties, by adviser type and fiduciary status

(a) Risk-adjusted returns (b) Unadjusted returns



selection. Finally, if there were significant differences across borders, we would have expected differences in RIA behavior as well.

IV. Does Fiduciary Duty Improve Investor Welfare?

To understand whether investor welfare improves through the imposition of fiduciary duty, we look at two sets of outcomes. First, in Section IV.A we ask whether fiduciary duty increases investor returns. Second, in Section IV.B we check whether improvements in returns are negated by a contraction in the size of the market. We consider an increase in returns coupled with non-decreasing market size as evidence of an increase in investors' welfare.[16]

IV.A. Effects on Returns

Figure 3 shows the distribution of returns, both risk-adjusted and not, of products sold by advisers in border counties, conditional on adviser type and fiduciary status. The distribution of returns for BDs in states with fiduciary duty is shifted rightward relative to states without it, for both risk-adjusted and unadjusted returns. The distributions for RIAs are almost identical for states with and without fiduciary duty,

[16]For this not to be the case, there would have to be strong preferences for advisory firms beyond the returns accrued by the products they sell. While in other settings there is substantial evidence of non-financial preferences for firms, whether these are welfare-relevant is up for debate.

Table 3: Returns on variable annuity products

	(1) Risk Adjusted Returns	(2) Unadjusted Returns
DID	0.0025**	0.0047*
	(0.0011)	(0.0023)
FD on BD	0.0020**	0.0034
	(0.0009)	(0.0021)
FD on RIA	-0.0006	-0.0013*
	(0.0010)	(0.0007)
Mean of Dep. Var	0.028	0.064
N	22,472	22,472

Annualized returns for variable annuities sold. Contracts are restricted to borders, specifications include border fixed, contract month, and age fixed effects. Standard errors are clustered at the state. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

lending credence to our empirical strategy.

The behavior of BDs with fiduciary duty does not mimic that of RIAs. Indeed, we do not expect it to. Broker-dealers and RIAs may work at firms that negotiate different contracts with FSP, may attract different clienteles, or may have different business models. Our identification strategy does allow for this selection across adviser types, as long as it is independent of the fiduciary status of the state.

Table 3 reports estimates of (1). Even controlling for compositional differences underlying Figure 3, we find a statistically and economically significant effect of fiduciary status on returns. Risk-adjusted returns increase by about 25 bp, which corresponds to approximately 9% of the base mean. This difference is due almost entirely to the effect on BDs, and—consistent with the figure—the effect on RIAs is negligible. Results are similar for unadjusted returns. The results are robust to heterogeneity in discounting across the population: in Appendix B.3, we let clients be a mix of those evaluating products in a risk-adjusted vs. an unadjusted manner. Over the space of all possible mixtures, we find that fiduciary duty improves returns by at least 18 bp.

IV.B. Effects on Market Size and Structure

This increase in returns may not improve overall welfare if the market for financial advice contracts, leading to fewer investments overall. In particular, critics of

Table 4: Market size and structure

	All Products	FSP Products		Entry		
	VA Sales	# of Contracts	Total Sales	Total Firms	BD Firms	RIA Firms
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbb{1}$[FD]	0.001	-0.023	0.043	-0.092	-0.157**	-0.037
	(0.049)	(0.064)	(0.046)	(0.069)	(0.076)	(0.068)
Mean	$51.1 M	55.5	$8.1 M	10.99	3.23	7.75
N	411	411	411	411	411	411

Regression of various metrics for total sales and number of firms on the fiduciary status of the county, controlling for log population, log median household income, and median age. Column (1) shows total sales of variable annuities across all firms. Columns (2) and (3) restrict to FSP and show number of annuity contracts (both fixed and variable) and total dollar sales of these contracts. Columns (4)–(6) show regressions of the number of firms of each type. All specifications use the $\log(x+1)$ transformation of the left-hand side, although means are presented without taking logs. Specifications include border fixed effects and standard errors are clustered at the border level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

fiduciary standards often claim that the net impact of such standards may be to decrease the number of firms and advisers in the market, thus limiting access to financial products for clients. To analyze this concern, we study whether the market size and the number of firms in the market changes.

First, we regress measures of market size on a fiduciary dummy, county controls, and border fixed-effects. We use three measures of market size: (i) total dollar sales of VAs at the county, which FSP has provided us through its membership in a consortium of annuity providers; (ii) total number of FSP contracts sold; and (iii) total dollar sales of FSP annuities. Table 4 provides results of these regressions. We find no statistically significant effects on market size. We estimate a zero effect of fiduciary status on dollar sales of VAs (across all providers). The standard errors allow us to rule out shifts of 10% in either direction with 95% confidence. We do not have data on sales of FIAs outside FSP, so Columns (2) and (3) focus on total FSP sales. We estimate a negative impact of fiduciary status on the number of annuity contracts sold by FSP and positive impact on total dollar sales of FSP annuities, but these effects are statistically indistinguishable from zero.

Second, we regress the (log of one plus the) total number of firms in a county on fiduciary status, controlling for border fixed effects and county covariates. We say a firm has entered a county if it employs at least one adviser in that county who is marked as actively selling financial products in Discovery, regardless of whether it transacts with FSP. We find evidence of both a level and a compositional effect of fiduciary duty on market structure. Column (4) shows that imposing fiduciary duty reduces the total number of firms in the market by about 9%, although we cannot rule out a zero effect at the 10% level. Columns (5) and (6) suggest that this effect comes primarily from a drop in the number of BD firms, which are affected by the regulation. The number of such firms drops by 16% in counties with fiduciary duty, a number that is significant at the 5% level. By contrast, we do not estimate a statistically (or economically) significant effect on the number of RIA firms.[17]

On net, we find limited effects of fiduciary duty on the total size of the market despite exit of BD firms. An increase in returns without a corresponding drop in market size suggests that overall investor welfare increases in states with common law fiduciary duty.

V. Product Characteristics

The previous section establishes that fiduciary duty leads to an increase in returns without an appreciable change in market size. What are the changes in the characteristics of the underlying products transacted that lead to these observations?[18] There are two reasons for focusing on product characteristics. First, these properties are usually salient in prospectuses and brochures. Thus, they may well be the avenue through which steering towards higher-quality products happens: advisers may be more upfront about fees and expenses, or highlight that certain products have more restrictive investment options. Second, given these properties are the components of the returns that are presented in Section IV, understanding how fiduciary duty impacts them will help unpack the computations above.

[17] In Appendix B.4, we study whether fiduciary duty induced a compositional shift even within BD firms, and we divide firms into natural categories based on their footprint—e.g., whether they are local or national. We find evidence that local firms are most strongly affected common law fiduciary status. Moreover, while results are noisy, we do not find any evidence of an increase in the number of firms of any footprint.

[18] Recall that products characteristics, and thus payout streams, do not vary across states; what varies is the probability they are transacted.

V.A. Product Type

We estimate (1) with the raw properties of annuities mentioned in Section III on the left-hand side. The most salient characteristic is the type of annuity: variable or fixed indexed. Given that variable and fixed annuities serve similar purposes, the type of annuity is a salient characteristic of a product that an adviser can influence. Column (1) of Table 5 uses a dummy for whether the annuity is a variable annuity as the outcome variable, and we find a difference-in-differences estimate of a drop in the probability that the annuity is a variable annuity of 11 pp, or 12.5% of the base mean. Once again, the RIA effect is small (2.1 pp) compared to the BD difference (-8.9 pp), consistent with the fact that RIAs face the same regulatory regime and with the assumption that there are no changes in market characteristics at the border.

An adviser with fiduciary duty may be drawn to fixed annuities for a variety of reasons. First, FIAs tend to have higher (risk-adjusted) returns according to our calculations, and advisers may be aware that such annuities tend to be "better deals" and thus less willing to push variable annuities if they have fiduciary duty. Second, FIAs are simpler to explain to clients, because they do not include income and contract bases, or the complex riders that come with variable annuities. A shift to simpler products may limit the likelihood of the adviser being brought to the courtroom or arbitration by a client who claims fees and terms had not been properly explained. It would also be consistent with advisers using complexity as a proxy for (worse) quality; there is evidence that such a correlation exists in other settings (Célérier and Vallée, 2017). Finally, given that FIAs cannot generate negative unadjusted returns while VAs can, the shift to FIAs would also be consistent with a shift towards products that limit complaints from downside realizations.[19] Column (2) provides evidence of a shift towards products with lower downside risk, using the 10^{th} percentile of the total growth of a product as a measure.[20] Broker-dealers with fiduciary duty sell products with higher 10^{th} percentile returns.

[19]Only the income base of a VA is guaranteed to not have a negative return. The actual account value is not. Since the income base cannot be withdrawn, only annuitized, and the NPV of this annuity is lower than the dollar value of the income base, this implies that individuals with sufficiently low returns will receive lower payments than the value of their investment amount.

[20]An outcome where at the terminal age of the product, the client can withdraw K times the initial principal of the contract will be recorded as K. See Appendix D for details.

Table 5: Characteristics of products transacted

			Expense Ratio		Fund Returns		Fees	
	$\mathbb{1}$[VA]	10^{th} Perc.	Minimum	Average	Optimal	Equal	M&E	Surr. Chg.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DID	-0.110***	0.704**	-0.006*	0.053**	0.0197*	0.0023**	-0.055	0.213
	(0.039)	(0.342)	(0.003)	(0.023)	(0.0107)	(0.0010)	(0.038)	(0.153)
FD on BD	-0.089**	0.568	-0.007**	0.062***	0.0195*	0.0023**	-0.047	0.123
	(0.035)	(0.354)	(0.003)	(0.020)	(0.0098)	(0.0010)	(0.035)	(0.158)
FD on RIA	0.021	-0.135	-0.001	0.009	-0.0002	-0.0000	0.009	-0.089
	(0.027)	(0.186)	(0.002)	(0.010)	(0.0036)	(0.0006)	(0.020)	(0.078)
Base Mean	0.878	2.609	0.501	1.263	0.159	0.012	1.088	3.109
N	22,472	22,472	19,730	19,730	19,730	19,730	19,730	19,730

	# Funds			# Equity Styles		# FI Styles	
	All	$\geq$ 4 Stars	$\leq$ 2 Stars	High Q.	Only Low Q.	High Q.	Only Low Q.
	(9)	(10)	(11)	(12)	(13)	(14)	(15)
DID	8.44*	3.84**	1.88	0.748**	-0.501*	0.277	-0.079**
	(4.28)	(1.89)	(2.01)	(0.330)	(0.251)	(0.186)	(0.034)
FD on BD	10.87***	3.59**	3.51	0.764***	-0.564**	0.169	-0.092***
	(3.91)	(1.57)	(2.15)	(0.262)	(0.214)	(0.171)	(0.029)
FD on RIA	2.43	-0.25	1.63	0.016	-0.063	-0.108	-0.013
	(2.20)	(0.86)	(1.31)	(0.148)	(0.127)	(0.091)	(0.008)
Base Mean	96.81	32.04	31.35	7.215	0.865	4.408	3.028
N	19,730	19,730	19,730	19,730	19,730	19,730	19,730

Estimates of (1) for various product characteristics. Columns (1) and (2) use the set of all annuities transacted in the border, while the other columns restrict to variable annuities. Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

V.B. Fees and Fund Returns

The remainder of Table 5 studies shifts within the VA market. A salient property of the investment menu is the expense ratio of the funds. Column (3) shows that the minimum expense ratio decreases by about 0.6 bp off the baseline of 50 bp, showing that clients have access to a (slightly) lower fee option. However, Column (4) shows that the average expense ratio increases by about 5.4 bp, which may be relevant if one is concerned about naive allocation methods. Column (5) documents a shift towards VAs that have funds with higher mean returns, net of expense ratio, assuming a return-maximizing allocation; the effect is substantial, amounting to about 13% of the base mean. Column (6) shows a similar result assuming a naive equal allocation rule, which allays concerns about the increase in the average expense ratio.

Columns (7) and (8) documents noisy effects on the two most salient fees associated with the product: the M&E fee and the surrender charge. We find a small and statistically insignificant decrease of 5.5 bp in the M&E fee and a noisy increase of about 21 bp in the surrender charge. We should highlight that unlike M&E ratios and expense ratios, the surrender charge is not necessarily paid. Additionally, lower fee FSP products always come with higher surrender charges, so advisers who are unconcerned about their clients needing to withdraw early should steer them towards higher surrender charge products.

V.C. Diversification

Another characteristic of interest is the number of funds available to investors. Column (9) estimates that fiduciary duty leads BDs to sell products with about 8.4 more funds, relative to the difference in RIA sales. Column (10) shows an increase of about 12% in the number of "high-quality" funds, as measured by Morningstar ratings of 4 or 5 stars. However, Column (11) reports a positive but less precisely estimated increase of about 6% in low-quality funds as well—as proxied by 2 or fewer stars. The increase in high-quality (or low-quality) funds is not a mechanical consequence of having a larger set of funds: the set of investment options offered is an active product design decision by FSP, and when it chooses to offer a product with more options it could only add low-quality funds.

A second relevant metric is the diversity of funds available. Using the categorization into equity and fixed income styles discussed in Section III, Columns (12) and (13) document an economically and statistically significant increase in the number of equity styles covered by at least one high-quality fund and a decrease in the number of equity styles covered by only low-quality funds. Columns (14) and (15) repeat the analysis for fixed income styles, but the effects are noisier and of smaller magnitude.

V.D. Discussion

While many of these characteristics feed into the returns computed in Section IV, not all of them are directly tied to returns. However, they are salient to clients and advisers, and responsiveness of such observable dimensions provides further credence that fiduciary duty is having an effect. Moreover, these characteristics are interesting since they are tied, at least heuristically, to higher quality. Historical returns of investment options are publicized in prospectuses and marketing brochures, and advisers with fiduciary duty may be hesitant to recommend products with low investment returns—even if risk-adjusted returns are aligned with the market. An adviser and a client who have a more-choice-is-better mindset may find products with a large number and variety of investment options more attractive. In the process of following these quality heuristics, advisers may well steer clients to products that indeed have higher returns on net.

A somewhat different reason these characteristics are interesting is that they may be related to recourse. Litigation about fiduciary duty in other settings, including ERISA, has cited higher numbers of investment options, higher quality funds, lower expense ratios, higher returns, and lower fees as supporting the conclusion that fiduciaries is performing their function. FINRA arbitration sometimes also cites similar characteristics as complaints against advisers. We are unable to say whether advisers are operating on heuristics they truly believe to be correlated with higher quality, or whether they are responding to other incentives such as a desire to avoid litigation; nevertheless, regardless of the underlying mechanism, we find evidence that characteristics of transacted products change when fiduciary duty is introduced.

VI. A Model of Fiduciary Duty

The previous sections have estimated the causal effect of extending common law fiduciary duty to BDs. A natural question is whether we can extend these results to speak to the effects of extending fiduciary duty to BDs at the federal level. This presents two challenges. The first is that it is unclear how the stringency of federal fiduciary duty would compare to its common law counterpart. The second is that extrapolating from border counties to the national level is fraught with the usual concerns regarding external validity.

Our approach to make headway on this issue is to understand the mechanism by which common law fiduciary duty operates: does it operate by increasing the cost of delivering low-quality advice or by increasing the fixed cost of doing business? One can rationalize our previous results through either channel. On the one hand, if fiduciary duty constrains low-quality advice, mean advice quality will increase. On the other, if advisers who offer the worse advice are also the least profitable, then an increase in fixed costs will drive them out of the market and also improve mean advice quality. One cannot assume that the advisers who offer the worst advice are also the least profitable: there is substantial heterogeneity across firms in commission schedules negotiated with FSP, scale, reputational considerations, and exposure to legal liability, among other issues. Instead, we build a model that provides testable implications of a constraining effect of fiduciary duty on low-quality advice without assumptions about the relationship between profitability and advice quality.

The intuition for these implications is simple: say firms earn profits as a function of the advice they give and of competition, and that there is heterogeneity across firms in both their profit-maximizing advice and their actual profits. In equilibrium, one can conceptualize the firms entering in decreasing order of profitability until the marginal firm breaks even. If fiduciary duty only raises the fixed cost of doing business, the marginal firm would have to be more profitable, but the ordering of profitability would not change. This implies that the set of entering firms is contained by the set of entrants in the baseline. However, if fiduciary duty increases the cost of providing low-quality advice, this will alter the relative profitability of firms, potentially leading to a different set of observed advice in the market. For instance, we might see the emergence of especially high-quality advice. We now formalize this intuition, study its robustness to several extensions, and deliver a set of testable implications we can take to the data.

VI.A. Elements of the Model

To begin, assume that all firms are BDs; we add RIA firms to the model in Appendix A.2. Suppose there are M *categories* of firms indexed by m. This is meant to capture that the effect of fiduciary duty can vary across local, regional and national firms. Each firm j has a *type* $\theta_j \in [0, 1]$ and can choose advice $a \in [0, 1]$. We adopt the convention that higher values of a correspond to worse, or more distorted, advice. The distribution of types within category m is $H_m(\cdot)$. We assume $H_m(\cdot)$ is continuous, and we abuse notation by letting $H_m(S)$ denote the mass of types in set S. A firm of type θ and category m has a *base profit* function $\pi_m(a + g_m(\boldsymbol{\mu}); \theta)$ that we assume is single-peaked. As a normalization, we say that the maximum is attained at $a = \theta$ for some known value $\bar{\boldsymbol{\mu}}$. The actual profit of a firm of category m and type θ who enters and gives advice a when the equilibrium mass of entrants is $\boldsymbol{\mu} = (\mu_1, \ldots, \mu_M)$ is

$$f_m(\boldsymbol{\mu}) \cdot \pi_m \left(a + g_m(\boldsymbol{\mu}); \theta\right) - K_m,$$

where $f_m(\cdot)$ is decreasing in every component of $\boldsymbol{\mu}$, $g_m(\cdot)$ is increasing in each component of $\boldsymbol{\mu}$, and both are independent of θ. We conceptualize $f_m(\cdot)$ as the number of customers a firm receives if there are $\boldsymbol{\mu}$ entrants, $g_m(\cdot)$ as the direct effect of competition on advice, and K_m as the fixed cost of entry.

In equilibrium, the set of firms who enter the market is exactly the set that makes positive profits. Denote by $\mathcal{E}_m(\boldsymbol{\mu}, K_m)$ the set of types θ_j of category m who would enter if they believe that a mass $\boldsymbol{\mu}$ of firms of each category would enter and the fixed cost of entry is K_m. Then, for a fixed cost vector $\boldsymbol{K} \equiv (K_1, \ldots, K_M)$, an equilibrium consists of a mass $\boldsymbol{\mu}^*(\boldsymbol{K})$ such that

$$H_m \left(\mathcal{E}_m(\boldsymbol{\mu}^*(\boldsymbol{K}), K_m)\right) = \mu_m^*(\boldsymbol{K}).$$

It is instructive to discuss the elements of this model. First, θ captures the latent propensity to offer distorted advice. We remain agnostic about the sources of differences in θ. Firms may have negotiated different commission schedules with wholesalers and may also provide different splits of the commissions to individual advisers. They may also place different levels of emphasis on reputational considerations, or have different beliefs about the probability or cost of litigation. A key aspect of θ will be that the costs of fiduciary duty—which we will model in detail below—may vary depending on the advice given and on firm category, but will not *directly* depend on θ. This is meant to capture that the effects of regulation can vary as a function of the actual advice given and the firm category (for example, local, regional, or national), but not on the latent profitability of giving worse advice.

Second, $f_m(\cdot)$ and $g_m(\cdot)$ capture the two ways in which competition can affect advice: by shifting the quantity of consumers a firm receives ($f_m(\cdot)$) and by directly changing advice ($g_m(\cdot)$). Since $f_m(\cdot)$ changes how total profits scale with competition, it is natural to assume that it decreases with each component of $\boldsymbol{\mu}$. Note that we are excluding a direct effect of θ on $f_m(\cdot)$, essentially ruling out that the mass of consumers received by a firm (conditional on their category) is a function of their advice quality. We find this assumption to be reasonable for a number of reasons. First, given the previous evidence on the lack of consumer information in this market (SEC, 2011, 2013a,b; Egan et al., 2019), it seems unlikely that consumers are sorting to advisers based on unobserved profitability differences that remain after conditioning on firm observables captured by m; sorting that depends on characteristics like whether the firm is nationally recognized can be captured through the dependence on m. Second, note that this assumption is analogous to assuming that θ enters into $f_m(\cdot)$ in a multiplicatively separable fashion, so that we can envelope the effect of θ on $f_m(\cdot)$ into π, which does depend flexibly on θ. Thus, one can think of the restriction that $f_m(\cdot)$ is independent of θ as saying that the effect of the type on profits does not *differentially* change with competition.

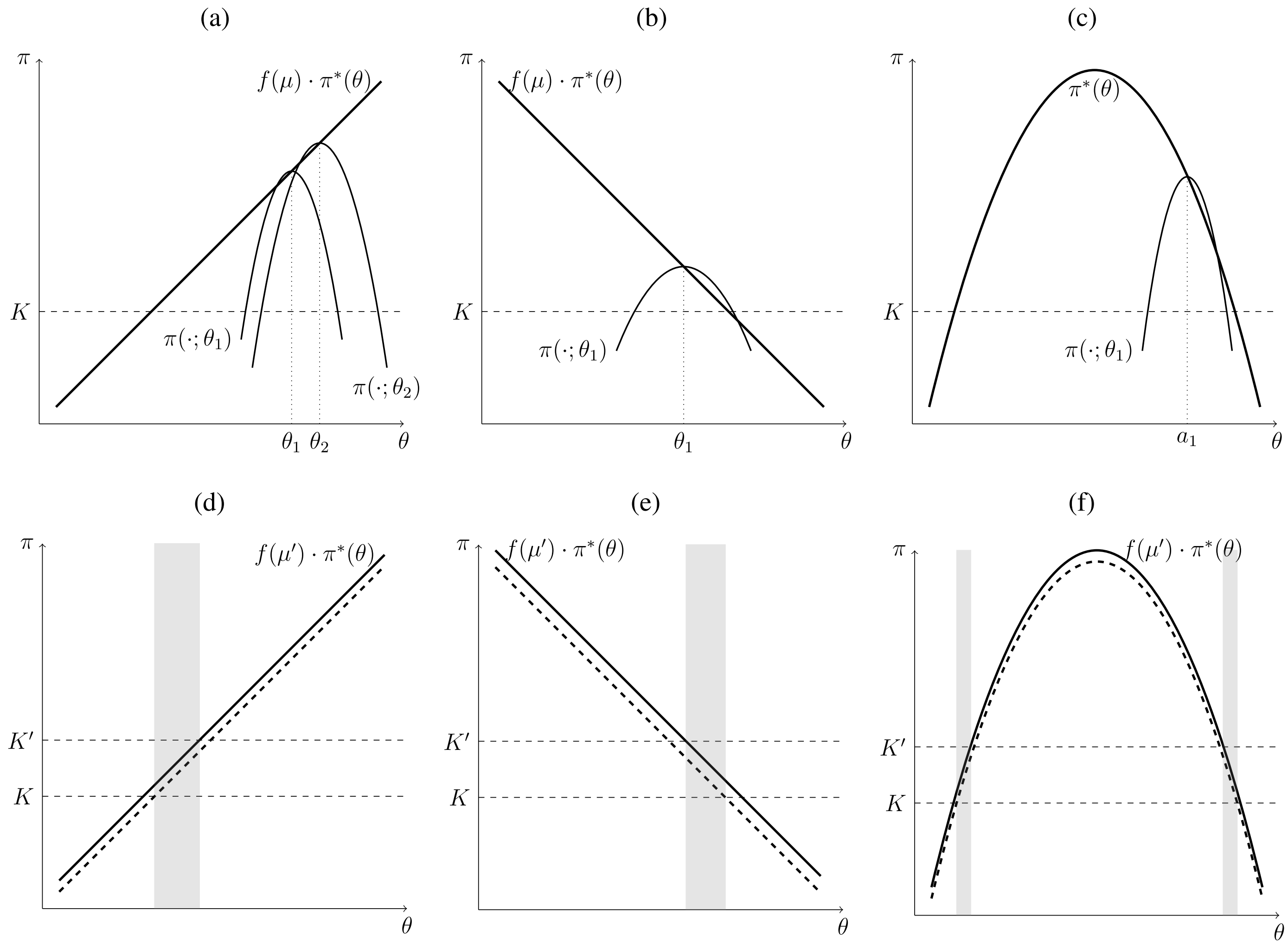
Next, consider $g_m(\cdot)$. We introduce this function to allow for competitive effects on advice—in particular, for the possibility that increased competition directly improves advice. Upon entry, a firm will choose advice a to maximize $\pi(a + g_m(\boldsymbol{\mu}); \theta)$. Thus, $g_m(\cdot)$ shifts the location of optimal advice without directly affecting profits.

As discussed before, we will assume that $g_m(\boldsymbol{\mu})$ is increases in each component of $\boldsymbol{\mu}$, so that increasing competition improves advice by shifting the optimal advice $a^*(\theta; \boldsymbol{\mu}) \equiv \arg\max_a \pi(a + g_m(\boldsymbol{\mu}); \theta)$ to the left. We believe that this monotonicity assumption is justifiable for a number of reasons. Tougher competition makes it easier for consumers to visit multiple financial advisers and identify questionable advice, as in some credence goods models (Dulleck and Kerschbamer, 2006). Furthermore, evidence from Egan et al. (2019) suggests that financial advisers with misconduct records are more likely to survive in markets with lower competition. Third, given that the "price" of the product is the same regardless of which adviser the client visits, concerns like showrooming effects—in which competition decreases the incentive to provide effort in advising clients—are not present in this market. Finally, firm strategies that depend on the distribution of θ likely also rely on consumers' knowledge of θ for each firm, which is unlikely in this setting. As with $f_m(\cdot)$, we still let $g_m(\cdot)$ depend directly on m so that consumers can be influenced by more salient aspects, like whether the firm is nationally recognized.

Finally, when we discuss our model of fiduciary duty below, we will not let $f_m(\cdot)$ or $g_m(\cdot)$ depend directly on whether the market has fiduciary duty. Arguing that $f_m(\cdot)$ and $g_m(\cdot)$ changes due to demand side factors induced by fiduciary standards suggests that imposing common law fiduciary duty changes how many people go to various firms, what type of firms they go to, or what sort of products they ask for when they arrive at these firms. Given the substantial survey evidence cited above that customers are not even aware of the fiduciary status of their advisers, we find it a priori implausible that consumers are making decisions about which advisers to talk to based on the common law fiduciary status of the state.

To illustrate the model, consider the case with $M = 1$ category and $g(\cdot) = 0$. Define $\pi^*(\cdot) \equiv \max_a \pi(a; \theta)$. Given that we do not take a stance on the source of heterogeneity, we also cannot take a stance on the behavior of $\pi(\cdot; \theta)$, and thus $\pi^*(\theta)$, with θ. Figure 4(a)–(c) illustrates three possibilities for $\pi^*(\cdot)$ and sample graphs of $\pi(\cdot; \cdot)$. Panel (a) illustrates the case where worse advice corresponds to highest profits. As discussed above, however, higher θ firms may in fact have lower profits so that cases such as (b) and (c) are also possible. Below, we develop predictions that hold over any shape of $\pi^*(\cdot)$.

Figure 4: Illustration of $\pi(\cdot;\cdot)$ and $\pi^*(\cdot)$, and the effects of a pure fixed cost channel



Different possible profit envelopes $\pi^*(\cdot)$, along with plots of the underlying $\pi_i(\cdot;a)$ that generate them. The fixed cost K is presented, and the fixed cost channel involves increasing this value. Panels (d)–(f) illustrate the effects of a pure fixed cost channel, by increasing the fixed cost from K to K'. The shaded types are the ones who exit the market. Note that types map directly to advice (in the same way) in each panel, but we do not show the underlying density $H(\cdot)$ of types.

VI.B. The Fixed Cost Channel

We return to the general model. We say that fiduciary duty operates through a *pure fixed cost channel* if imposing fiduciary duty on a market increases fixed costs of entry from K_m to $K'_m \geq K_m$ for all θ but does not alter $\pi(\cdot;\cdot)$ or the distribution $H_m(\cdot)$ of types in any way. This increase in fixed costs could correspond to compliance software or insurance, increased paperwork, increased overhead time required to deal with regulation, increased effort dedicated to oversight, etc.[21] In Appendix A.1.2, we prove the following.

Proposition 1. *Suppose $K'_m \geq K_m$ and that $\mu^*_m(\boldsymbol{K}') \leq \mu^*_m(\boldsymbol{K})$. Define $\mathcal{E}_m \equiv \mathcal{E}_m(\boldsymbol{\mu}^*(\boldsymbol{K}), K_m)$ and $\mathcal{E}'_m$ analogously. Then, $\mathcal{E}'_m \subseteq \mathcal{E}_m$.*

Proposition 1 states that if only the fixed cost increases, and if this leads to weak decreases in the mass of each category of firm, then the new set of firms who enters is a subset of the original set of firms. Note that the assumption that $\mu^*_m(\boldsymbol{K}') \leq \mu^*_m(\boldsymbol{K})$ is a not an assumption on primitives. However, one does expect that the assumption that an increase in fixed costs leads to a decrease in entry is a natural one. To formalize this intuition, Lemmas 1 and 2 in Appendix A.1.1 consider the simpler model with $M = 1$ and verify that the equilibrium is unique and the comparative statics with fixed costs imply that the number of entrants decreases with fixed cost increases.[22] We impose this assumption for two reasons. With $M > 1$ categories it is in principle possible to have the mass of one category increase due to decreased competition from another. Furthermore, given a partition of firms into categories, the mass of firms that enters is observable. Thus, this condition is testable and empirically useful.

Note also that the type θ can be multidimensional, to incorporate effects like

[21] In this section, we write the change in fixed costs as a change to the fixed costs of entry. We can instead have a constant fixed cost of entry and say that the effect of the fixed cost channel is to change the base profit function from $\pi(\cdot;\cdot,\cdot)$ to $\pi(\cdot;\cdot,\cdot) - c$. This would correspond to an increased per-transaction cost due to fiduciary duty. The key similarity, as discussed later, is that c is independent of advice and the ordering of profitability of types does not change with the imposition of fiduciary duty. Essentially, one should think of the "fixed" cost as fixed across types.

[22] We can in fact go further and say that even if there are firms who are not directly impacted by fiduciary duty, as long as competition between different firm categories is "not too strong"—in a manner that can be formalized—then the aforementioned comparative statics hold.

provision of different advice to different groups of customers. Appendix A.1.3 provides some examples and argues that the testable predictions below do not change. The key connection between these generalizations—as discussed at the start of this section—is that the above inclusion holds as long as fiduciary duty does not change the relative profitability of different types of firms. Thus, it simply shrinks the set of types who enter rather than rearranging them.

Since θ is not observable to the econometrician, to take Proposition 1 to the data we look for predictions on advice. In the following observation, we denote by $\underline{a}(\boldsymbol{K})$ and $\bar{a}(\boldsymbol{K})$ the least and most distorted advice observed among any entrants of any category in the market, as a function of the fixed costs.

Proposition 2. *Suppose $K'_m \geq K_m$ and that $\mu^*_m(\boldsymbol{K}') \leq \mu^*_m(\boldsymbol{K})$. If $g_m(\boldsymbol{\mu}) = 0$ for all m, then $\underline{a}(\boldsymbol{K}') \geq \underline{a}(\boldsymbol{K})$ and $\bar{a}(\boldsymbol{K}') \leq \bar{a}(\boldsymbol{K})$. If $g_m(\boldsymbol{\mu})$ is increasing in every component of its argument, $\underline{a}(\boldsymbol{K}') \geq \underline{a}(\boldsymbol{K})$.*

We prove this proposition in Appendix A.1.2. Under the pure fixed cost channel, the set of types that enter the market under fiduciary duty is a subset of the set that enters without. If competition does not have a direct impact on advice, then it must be that the advice we observe is also a subset. This would imply that the best advice in the market must (weakly) worsen and the worst advice should (weakly) improve. If competition improves advice, exit induced by the fixed cost increase would worsen all advice; thus, the prediction on best advice remains while the prediction on worse advice is now ambiguous. Thus, one testable prediction is that under the fixed cost channel the best observed advice does not improve when imposing fiduciary duty.

Importantly, there are no analogous predictions for how fiduciary duty affects moments such as the mean of the distribution of advice, even if it operates purely through a fixed cost channel. This is because we are not taking any stance on the shape of $\pi^*(\cdot)$ or $H(\cdot)$. Panels (d)–(f) of Figure 4 illustrate the effects of increasing the fixed cost in panels (a) through (c), again restricting to $M = 1$ and $g(\cdot) = 0$. In each situation, K increases to K', but the effective profit function $(f(\mu) \cdot \pi^*(\cdot))$ also increases slightly due to exit of firms, from the dashed lines to the solid ones. On net, however, firms exit, as denoted by the shaded areas. In panel (d), fiduciary duty operating through a fixed cost channel will increase the mean a since $\pi^*(\cdot)$ increases in θ and increasing the fixed cost simply excludes low-θ firms from the market. In panel (e), the argument is reversed. In panel (f), the effect on the mean depends on $H(\cdot)$. In all three panels, however, the extremes of advice (weakly) decrease.

A second prediction relates to how a particular firm changes the advice it provides as a function of fiduciary duty. Suppose first that competition does not directly impact advice. Then, if a firm is able to cover the fixed cost of entry, the advice it provides does *not* depend on the fixed cost. If instead competition directly improves advice, then if the imposition of fiduciary duty increases fixed costs, the advice a firm provides will (weakly) worsen. We formalize these observations in the following.

Proposition 3. *Suppose $K'_m \geq K_m$ and that $\mu^*_m(\boldsymbol{K}') \leq \mu^*_m(\boldsymbol{K})$. Let $a^*_m(\theta; \boldsymbol{K})$ be the advice provided by a type θ firm of category m who enters when costs of entry are $\boldsymbol{K}$. Then $a^*_m(\theta; \boldsymbol{K}) \leq a^*_m(\theta; \boldsymbol{K}')$, with equality if $g_m(\cdot) = 0$.*

The proof, which we omit, notes that $a^*_m(\theta; \boldsymbol{K}) \equiv \arg\max_a \pi_m(a + g_m(\boldsymbol{\mu}); \theta)$ does not depend on $\boldsymbol{K}$ directly, and the direct effect of competition simply shifts the location of the maximum of the profit function. The testable implication is that under a pure fixed cost channel we should not see the advice of a firm improving upon imposition of fiduciary duty.

VI.C. The Advice Channel

Alternatively, fiduciary duty could make it differentially more costly to offer low-quality advice. We call this effect the *advice channel*. To model this channel, we say that the imposition of fiduciary duty introduces a cost function $c(a)$, where $c(a)$ is increasing in a. The profit to type θ from giving advice a is then $\pi_m(a + g_m(\boldsymbol{\mu}); \theta) - c(a)$. In this section, we will show that the predictions outlined in the previous section need not hold under an advice channel.

As an illustration, set $g_m(\cdot) = 0$ and suppose $c(\cdot)$ is such that fiduciary duty places a cap on advice: $c(a) = 0$ for $a \leq \bar{a}$ and $c(a)$ is infinite for $a > \bar{a}$. Figure 5(a) illustrates that firms with especially high values of θ, such as θ_2, cannot profitably offer any level of advice, and will be forced to exit. If there is exit of high θ firms, this makes it profitable for very low-θ firms to now enter, leading to the appearance of previously unprofitable high-quality advice. That is, the lowest type $\underline{\theta}$

that enters decreases, and thus the highest-quality advice observed improves as well. Additionally, a firm that remains in the market after the imposition of fiduciary duty can actually improve its advice. Firms with moderately high values of θ, such as θ_1, will still profitably operate but will adjust their advice to $\bar{a} < \theta_1$. Neither of these observations could be rationalized through a pure fixed cost channel.

These observations are robust to any increasing $c(\cdot)$ and not a consequence of the stark assumption that fiduciary duty places a cap on advice. If $c(\cdot)$ is increasing, then it effectively acts as a handicap for higher-θ firms and can induce them to exit the market, leading to entry of lower-θ firms. Also, it is not necessarily the case that only high θ firms will improve their advice. Indeed, in the absence of a competitive effect on advice, all firms will have an incentive to improve their advice.[23] This also implies that in general, the emergence of high quality advice upon imposing fiduciary duty can come both from firms who only enter under fiduciary duty and from firms who enter in both regulatory regimes improving their advice.

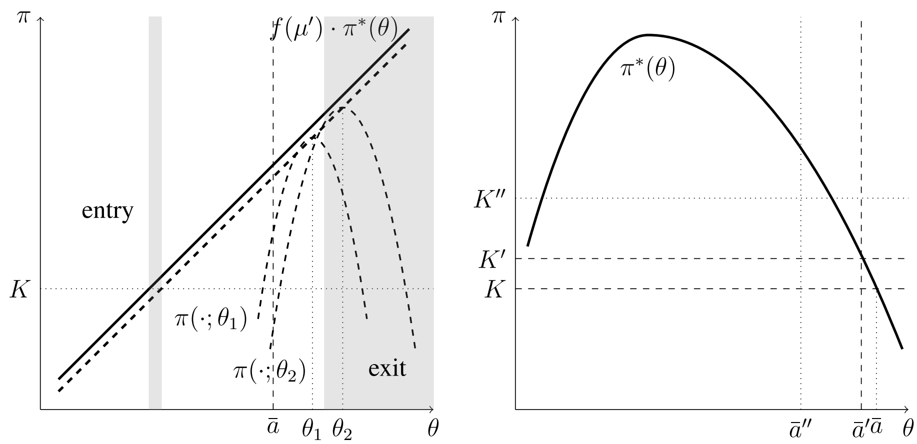
One should not interpret the previous observations as necessary conditions for an advice channel. It is still possible for both extremes of the advice distribution to contract and for firms who enter both with and without fiduciary duty to offer worse advice under the more stringent standard, just like in a pure fixed cost channel. For example, if competition improves advice, then exit of low advice quality firms might lead surviving firms to worsen the advice they give. This would happen if the effect of competition is stronger than the effect of the cost of providing distorted advice, and could lead to a contraction of the best observed advice. Moreover, note that if an advice channel is present, then the worst advice could also worsen upon imposing fiduciary duty: in the case where firm types are multidimensional (see Appendix A.1.2), it is possible for the advice channel to induce entry of firms who give low a to most types of consumers but especially high a to a small set of them. The key observation, however, is that in an advice channel—unlike in a fixed cost channel—it is not necessary that both extremes of the advice distribution contract or for within-firm advice to worsen.

[23]See Appendix A.1.4 for a simple argument with monotone comparative statics.

Figure 5: Further illustration of the model

(a) Advice channel

(b) Distinguishing channels



(a) Moving from the baseline (thick, dashed lines) to a fiduciary standard in which advice can be no larger than $\bar{a}$. The shaded area to the right illustrates types who exit due to the regulation since they cannot profitably adjust their advice. The shaded area to the left illustrates types offering previously unprofitably good advice who enter since the effective profit function increases due to the aforementioned exit. (b) A profit envelope under which strengthening fiduciary standards will lead to different results under a pure fixed cost channel and an advice channel (proxied by a cap)

VI.D. The Importance of Distinguishing These Channels

We argued earlier that distinguishing whether common law fiduciary duty operates through the advice channel or through the fixed cost channel offers insights into the effects of extending fiduciary duty at the federal level, and that quantifying the effect of fiduciary duty on the mean of observed advice is not sufficient to identify the channel through which it operates. We can now use the model to formalize these statements. First, consider the situation depicted in Figure 5(b), and suppose that in the baseline market without any fiduciary standards, the worst observed advice is given by $\bar{a}$, and that imposing fiduciary standards moves the worst observed advice to $\bar{a}'$. This shift could be rationalized by either a fixed cost moving to K' or a cap of $\bar{a}'$ being imposed through fiduciary standards. Second, assume that the regulator is considering making the policy more stringent.[24] In an advice channel, tightening

[24]Stringency of fiduciary duty regulations is a matter of current policy debate. Advocates of the defunct DOL Rule argue that the SEC's Best Interest Regulation does not live up the same standards.

the cap to $\bar{a}'' < \bar{a}'$ would push low-quality advice out of the market. However, tightening a fixed cost channel to $K'' > K'$ would induce exit of both high and low quality advice. In principle, a regulator could avoid this situation by estimating the empirical counterpart of $\pi^*(\cdot)$ and $H(\cdot)$. As this is difficult, however, a regulator could alternatively try to limit unintended consequences by ensuring that fiduciary duty does not operate solely through a fixed cost channel.

This figure also highlights that one can be more confident of the external validity of the causal effect if fiduciary duty operates through the advice channel than if it operates through the fixed cost channel. In the former, every surviving firm will distort their advice weakly less, leading to an overall improvement of average advice. In the latter, whether average advice increases or decreases depends on whether more low-quality or high-quality advice firms are displaced. This hinges on $H(\cdot)$ and on the shape of $\pi^*(\cdot)$, objects that may be quite heterogenous across markets.

These two channels are neither mutually exclusive nor exhaustive: fiduciary duty could both increase fixed costs and constrain advice, and it could be the case that it affects neither. Below, we test the hypothesis that there is no advice channel.

VII. Does Fiduciary Duty Directly Constrain Advice?

Consider two identical markets, where one does not impose fiduciary duty on BDs and the other does. We wish to test whether an advice channel exists, i.e., whether fiduciary duty engenders a direct constraint on low-quality advice. The primary test the model in Section VI provides is at the market-level. Under a pure fixed cost channel, the highest quality advice offered by any BD in the market with fiduciary duty is weakly worse than that offered in the market without. However, under the advice channel, this highest quality advice can improve.[25]

We use our preferred metric of risk-adjusted returns as the measure of the quality of advice, partialling out border, contract month, and age fixed effects, to arrive at a

Proposed state legislation (rather than common law) is also anecdotally of different stringencies, especially since enforcement methods will be different.

[25]The tests in this section are predicated on a decrease in the number of BD firms in the market, which Section IV.B supports. Moreover, Appendix B.4 suggests that there is no evidence of increases in the number of BD firms of any geographic footprint—a proxy for “categories.”

Table 6: Effects on tails of risk-adjusted return distribution

Cutoff	0.010 (1)	0.015 (2)	0.020 (3)	0.025 (4)	0.030 (5)
BD Proportion	0.063	0.008	0.006	0.003	0.003
	(0.008)	(0.002)	(0.002)	(0.002)	(0.002)
BD Difference	0.003	0.012***	0.010***	0.010***	0.006**
	(0.011)	(0.004)	(0.004)	(0.004)	(0.003)
RIA Proportion	0.116	0.048	0.030	0.015	0.009
	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)
RIA Difference	-0.002	0.002	0.002	-0.001	-0.002
	(0.005)	(0.003)	(0.002)	(0.001)	(0.001)

Proportion of normalized risk-adjusted returns above various cutoffs as a function of adviser type and fiduciary duty. “BD Proportion” refers to the mass of advice above each cutoff for BDs in states without fiduciary duty. “BD Difference” is the difference in this quantity for BDs with and without fiduciary duty. The rows for RIAs are analogous. Standard errors are computed through the bootstrap. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

“normalized” risk-adjusted return that is comparable across all transactions. The test is based on the support of the distribution of this advice across adviser types, and we proxy for the support with the mass in the tails, i.e., the proportion of normalized returns that are above x for large values of x.[26]

The row marked “BD Proportion” of Table 6 shows the proportion of normalized returns above various cutoffs for BDs without fiduciary duty; the row marked “BD Difference” shows the change in this proportion when moving to border counties with fiduciary duty. For extreme cases, we find an economically and statistically significant increase in this proportion, consistent with an expansion of high-quality advice when imposing fiduciary duty. We find that changes in the shares in the tails are much more muted for RIAs than for BDs, which lends further credence to the fact that the changes in the distribution for BDs are not spurious. In summary, the

[26]Suppose we have two distributions A and B (with continuous and strictly increasing cdfs on their support) with the maximum M_A of the support of A strictly less than the maximum M_B of the support of B. We know that $F_A(M_A) = 1$ and $F_B(M_A) < F_B(M_B) = 1$, where $F_T(\cdot)$ is the cdf of T. Thus, $F_A(M_A) > F_B(M_A)$, so for x sufficiently close to M_A, $1 - F_A(x) < 1 - F_B(x)$ as well. For similar reasons, we could look at the effect on extreme quantiles; results are similar and available upon request. Mass in tails or quantiles are less sensitive to single observations than estimates for the support.

expansion in high-quality advice cannot be explained by a pure fixed cost channel but is consistent with the presence of an advice channel.

The model also provides a firm-level test. In a pure fixed cost channel, if a BD firm enters both markets, it offers weakly worse advice in the market with fiduciary duty. Under an advice channel, this firm may improve its advice under fiduciary duty. This test, however, is likely to be underpowered: if fiduciary duty does not greatly affect the cost of providing high-quality advice, then most firms entering both markets will not shift their recommendations. Nevertheless, we estimate (1) for all outcomes considered in this paper but also add firm fixed effects. Table B.6 in Appendix B.5 shows results of this analysis. While the results are noisy, as expected, the sign of the within-firm effect is broadly consistent with an increase in quality. This would not happen under a pure fixed cost channel.

VIII. Conclusion

This paper evaluates the effects of extending fiduciary duty to broker-dealers on returns, market structure, and observable characteristics of the the set of products consumers purchase. This question is motivated by recent regulatory discussion around expanding fiduciary duty to all broker-dealers. Supporters of the expansion argue that imposing fiduciary duty on all advisers will alleviate the conflict of interest and ensure that retirees choose products that are better suited to their needs. Opponents argue that fiduciary duty does not have a noticeable impact on product choice—perhaps because competition already disciplines financial advisers or perhaps because the conflict-of-interest was overblown to begin with—but will instead simply increase the cost of doing business, which will lead to fewer advisers in the market and fewer retirees purchasing beneficial products.

We evaluate these claims empirically by leveraging transactions-level data from a major financial services provider and a comprehensive dataset on the set of practicing financial advisers. We find that in the market for annuities, fiduciary duty increases risk-adjusted returns by 25 bp and induces an reduction of 16% in the number of BD firms without a change in the total sales of annuities. Unpacking this change in risk-adjusted returns we find that BDs with fiduciary duty are less likely to sell variable annuities; when selling a variable annuity, they are more likely to steer customers towards products with more and higher-quality investment options. These results offer a extensive picture of the different effects of fiduciary duty in the market for financial advice.

These results on the mean causal impact of fiduciary duty are not informative of whether it operates by increasing fixed costs or by constraining low-quality advice. We develop a model of firms entering a market and selecting their advice that identifies properties of the distribution of advice that allow us to unpack these mechanisms. We find evidence in favor of the presence of a constraint on low-quality advice; that is, fiduciary duty does not simply increase fixed costs. These results suggest that extending fiduciary duty beyond the state borders under study would also increase advice quality in these locations, and that increases in the stringency of fiduciary standards would continue to deliver increased returns for retirees.

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A. Further Analysis of the Model (For Online Publication)

In this appendix, we formalize the statements in Section VI, provide proofs of the propositions presented in that section, and provide further results.

A.1. Only Broker-Dealers

A.1.1. Settings with a Single Category

First consider a simple version of the model in Section VI.A, setting $M = 1$. There is a continuous distribution of types $\theta_j \sim H(\cdot)$ on compact support. Each type has a base profit function $\pi(a - g(\mu); \theta)$ maximized at $a = \theta$, and we define $\pi^*(\theta) \equiv \max_a \pi(a - g(\mu); \theta)$. Note that since the effect of competition is modeled as shifting the optimal advice, $\pi^*(\cdot)$ does not depend on μ. The actual profit a type-θ firm earns upon entering is $f(\mu) \cdot \pi^*(\theta) - K$, where K is the entry cost and $f(\cdot)$ is a strictly decreasing function of the mass μ of entrants capturing competitive effects. While we do not place much structure on π in general, suppose that $H(\cdot)$ and $\pi(\cdot)$ are jointly such that the distribution of $\pi^*(\theta)$ does not have any mass points; in the following, we will essentially consider the distribution of $\pi^*(\theta)$.

While the ordering of θ has an interpretation in Section VI.A, we strip it of its interpretation as the quality of advice in this appendix. Instead, relabel and rescale types $\tilde{\theta}$ be to be one-to-one with base profits $\pi^*(\theta)$ so that $\tilde{\theta}' > \tilde{\theta}$ if and only if $\tilde{\theta}'$ earns lower profits $\tilde{\pi}(\theta')$ than does $\tilde{\theta}$. Moreover, rescale types so that they are uniform on the unit interval. Let $\tilde{\Theta} : \theta \mapsto \tilde{\theta}$ be this function. Then, an equilibrium is such that $f(\mu) \cdot \tilde{\pi}(\mu) = K$, where μ is the marginal type who enters, as long as $\mu \in (0, 1)$. If $f(0) \cdot \tilde{\pi}(0) < K$ then no one enters, and if $f(1) \cdot \tilde{\pi}(1) > K$ then everyone enters.

Lemma 1. *There is a unique equilibrium.*

Proof. Note that $f(\mu) \cdot \tilde{\pi}(\mu)$ is strictly decreasing in μ. Thus, either $f(0) \cdot \tilde{\pi}(0) < K$ or $f(1) \cdot \tilde{\pi}(1) > K$, or it can take on a value of K at most once in $(0, 1)$. $\square$

Lemma 2. *The set of types θ_j who enter at an entry cost of $K' > K$ is a subset of the set of types who enter at an entry cost of K.*

Proof. Let $\mu^*(K)$ be such that $f(\mu^*(K)) \cdot \tilde{\pi}(\mu^*(K)) = K$. Then, it is easy to see that $\mu^*(\cdot)$ is decreasing in its argument. The set of types who enters is simply $\tilde{\Theta}^{-1}([0, \mu^*(K)])$, where $\tilde{\Theta}^{-1}(\cdot)$ is the inverse map of the function defined above. Thus, the set of types who enters under K' is the image of a smaller set, which means it is a subset of those who enter under K. $\square$

Lemma 2 shows that the nonprimitive condition in Propositions 1 and 2 is indeed an implication of $K' > K$ for $M = 1$ type. This result verifies that the conditions in these propositions are not mutually inconsistent: it is a potential implication at least in certain cases, and one that is testable.

A.1.2. Multiple Categories of Broker-Dealers

The model in Section VI.A allows for $M > 1$ categories. A natural concern is that even if fiduciary duty operates through a pure fixed cost channel, national broker-dealers might experience a smaller increase in fixed cost than local broker-dealers. We might imagine that $K'_{\text{local}} - K_{\text{local}} > K'_{\text{national}} - K_{\text{national}}$, and we may also expect these two categories to have different profit functions.

In this situation, it is *not* necessarily true that the advice observed in the market without fiduciary duty is a superset of advice observed with. One can construct a simple example in which $K'_1 > K_1$, $K'_2 = K_2$, and the support of the advice provided by Category 2 firms is strictly to the right of the support of that provided by Category 1—in the absence of fiduciary duty. Under reasonable conditions on $f(\cdot)$ (such as the ones in Appendix A.2), fiduciary duty will lead to a decrease in the number of Category 1 firms in the market and an increase in the Category 2 firms. Then, the advice under fiduciary duty will not be a subset of that without.[27] By itself, this possibility poses a difficulty for the testable restrictions discussed in Section VI, as expansion of advice could *still* be possible under a pure fixed cost channel with heterogeneous changes in fixed cost. However, note that this example required an expansion of the number of Category 2 broker-dealers. Indeed, (the contrapositive of) Proposition 2 is a general requirement for us to see an expansion of advice upon

[27] One can essentially go through Appendix A.2 and label the broker-dealers as "local broker-dealers" and the investment advisers as "national broker-dealers."

imposing of fiduciary duty, in a pure fixed cost channel. Here we simply provide proofs of the argument in Section VI.B.

Proof of Proposition 1. First, just as in Appendix A.1.1, let $\pi_m^*(\theta) \equiv \max_a \pi_m(a - g(\boldsymbol{\mu}); \theta)$. This does not depend on $\boldsymbol{\mu}$ since it just shifts the optimal advice. Let μ_m denote the equilibrium mass of type-m firms in a world with fixed costs K_m, and let μ_m' denote this mass in a world with fixed costs $K_m' < K_m$. Suppose $\mu_m' < \mu_m$. Then, a Category m firm with type θ enters at K_m' if $f_m(\boldsymbol{\mu}') \cdot \pi_m^*(\theta) \geq K_m'$, or $\pi_m^*(\theta) \geq K_m'/f_m(\boldsymbol{\mu}')$. Similarly, (θ, m) enters with costs K_m if $\pi_m^*(\theta) \geq K_m/f_m(\boldsymbol{\mu})$. Since $\mu_m' < \mu_m$, it must be that $K_m'/f_m(\boldsymbol{\mu}') > K_m/f_m(\boldsymbol{\mu})$, meaning if a type θ firm enters with fiduciary duty, it must enter without fiduciary duty as well. □

Proof of Proposition 2. If $g(\boldsymbol{\mu}) = 0$, then $a^*(\theta) = \theta$; i.e., the advice offered by a type θ firm upon entry is simply θ. Proposition 1 shows that $\mu_m' < \mu_m$ implies that the set of all firms who enter contracts. Thus, the set of advice offered by these entrants must shrink as well. This means the highest a observed in the market decreases, and the lowest a in the market decreases.

If $g(\boldsymbol{\mu}) \neq 0$, then $a^*(\theta; \mu)$ does depend on $\boldsymbol{\mu}$. If $g(\boldsymbol{\mu})$ is increasing in all its arguments, then $a^*(\theta; \boldsymbol{\mu})$ increases upon an increase in fixed costs. Proposition 1 still implies that the minimum θ among all entrants would increase. The advice a that this entrant would provide would also increase. Thus, the lowest quality advice would worsen as $K_m' > K_m$ if $\mu_m' < \mu_m$. □

To reiterate the observation of Proposition 2, we can reject a pure fixed cost channel with potential heterogeneity in the impact on fixed costs if we observe a *decrease* in the mass of a particular type of broker-dealers with a corresponding *introduction* of previously unseen advice.

A.1.3. Extending the Type

Note that these arguments just depend on the fact that there is a unidimensional ordering of types in terms of their base profits, and the base profits are the only component of these types that matter for who enters. Moreover, an increase in fixed costs of entry does not impact the ordering of these base profits; i.e., if $\pi^*_m(\theta_1; \boldsymbol{\mu}) < \pi^*_m(\theta_2; \boldsymbol{\mu})$ when entry costs are $\boldsymbol{K}$, then $\pi^*_m(\theta_1; \boldsymbol{\mu}) < \pi^*_m(\theta_2; \boldsymbol{\mu})$ when entry costs are $\boldsymbol{K}'$ as well. We show below that some natural extensions satisfy these conditions.

Idiosyncratic Entry Costs. Suppose that each potential entrant is now categorized by an ordered pair (θ_j, ϵ_j) and a category m, where $\epsilon_j \sim G(\cdot|\theta_j)$. A firm of type (θ_j, ϵ_j) has a base profit function $\pi_m(a; \theta_j) + \epsilon_j$. This extension allows firms who would offer the same profit conditional on entry to be differentially profitable. As before, let $\mathcal{E}^*_m(\boldsymbol{K})$ denote the set of types of category m who would enter with a fixed cost of $\boldsymbol{K}$. Thus, if we define

$$\underline{\theta}(K) \equiv \min \{\theta : \text{ there exists } m \text{ and } \epsilon \in \operatorname{supp} G(\cdot|\theta) \text{ such that } (\theta, \epsilon) \in \mathcal{E}^*_m(\boldsymbol{K})\}$$

and $\bar{\theta}(\boldsymbol{K})$ analogous with the min replaced by the max, we would again have $\underline{\theta}(\boldsymbol{K}) \leq \underline{\theta}(\boldsymbol{K}')$ and $\bar{\theta}(\boldsymbol{K}) \geq \bar{\theta}(\boldsymbol{K}')$. Since θ is the component of the type that is one-to-one with advice, the prediction that the extremes of advice weakly contract remains. If the profit function depended on $\boldsymbol{\mu}$ directly, it is easy to check that the second part of Proposition 2 would hold as well.

Heterogeneous Consumers. So far, we have allowed for one dimension of heterogeneity in advice among firms. In reality, firms face a variety of consumers and the advice that the firm offers could be specific to the type of consumer. To accommodate this possibility, let a firm's type be denoted by a vector $\boldsymbol{\theta}_j$ such that the profit of offering a consumer of type i advice a is $\pi(a; \theta_{ij})$, maximized at $a = \theta_{ij}$.[28] Thus, firms are now categorized by the advice they give to each type of consumer. We assume *random sorting* of consumers to firms so that each consumer receives a mass ν_i of consumers of type i. Then, the profit of a type $\boldsymbol{\theta}_j$ firm if a mass μ firms enter is

$$f(\mu) \cdot \sum_i \pi(\theta_{ij}; \theta_{ij}) \nu_i - K.$$

[28]We drop categories to limit the number of subscripts we must carry in the notation, but the arguments apply with multiple categories as well.

Again, Proposition 1 applies, so that $\mathcal{E}^*(K') \subseteq \mathcal{E}^*(K)$. Denote

$$\underline{\theta}(K) \equiv \min\left\{\theta : \theta = \min \boldsymbol{\theta}_j \text{ such that } \boldsymbol{\theta}_j \in \mathcal{E}^*(K)\right\}$$

as the minimum advice given to some consumer in the market, and define $\bar{\theta}(K)$ analogously. Then, once again, $\underline{\theta}(K) \leq \underline{\theta}(K')$ and $\bar{\theta}(K) \geq \bar{\theta}(K')$ purely from the fact that the set of firms who enter shrinks if fiduciary duty operates through a pure fixed cost framework.

A.1.4. A "Smooth" Advice Channel

The example in Section VI.C uses a stark advice channel where advice above a level is infintely costly. Here, we simply record the straightforward result that we can relax this assumption.

Proposition 4. *Suppose the cost $c(\cdot)$ of advice is weakly increasing. Then, holding the entry rate $\boldsymbol{\mu}$ fixed, advice of a firm weakly improves when moving from a market with fiduciary duty to a market without.*

Proof. Fix a type θ and a entry rate $\boldsymbol{\mu}$; suppress the dependence on $\boldsymbol{\mu}$. Let $a^*_{NFD}(\theta) \equiv \arg\max_a \pi(a;\theta)$ be the advice given by this type without fiduciary duty. θ is the advice given by this type in the absence of fiduciary duty. Suppress dependence on Note that the advice with fiduciary duty is

$$a^*_{FD}(\theta) \equiv \arg\max_a \pi(a;\theta) - c(a).$$

Consider the function $s(a,\lambda) \equiv \pi(a;\theta) - c(a)$, and let $a^*(\lambda)$ be the maximizer of this function. Note that $s(a,\lambda)$ has weakly decreasing differences in (a,λ) since $c(\cdot)$ is weakly increasing. Then, it must be that $a^*(\lambda)$ is weakly decreasing in λ. Since $a^*_{FD}(\theta) = a^*(1)$ and $a^*_{NFD}(\theta) = a^*(0)$, it must be that $a^*_{NFD}(\theta) \geq a^*_{FD}(\theta)$. Thus, advice weakly improves upon imposition of fiduciary duty, as long as the cost $c(\cdot)$ is increasing in its argument. $\square$

A.2. Adding Registered Investment Advisers

Now suppose that in additional to broker-dealers, there are registered investment advisers in the market as well. These RIAs will not be impacted by fiduciary duty in any way. We should first note that in a model with $M > 1$ categories of broker-dealers, we could think of an RIA as one of the categories—e.g., one for whom K_m never changes with policy. Indeed, in this section, we will effectively treat RIAs in this manner. In Section A.1.2, we noted that having $M > 1$ may not necessarily lead to comparative statics in which the set of broker-dealers drops. Thus, we show in this section that with one category of broker-dealer and one RIA type, there are natural conditions under which the set of broker-dealers who enters the market would shrink under an increase in fixed costs.

Both broker-dealers and RIA firms have a type θ_j, and the latent distribution of types for broker-dealers and RIAs is given by $H_{BD}(\cdot;\theta_j)$ and $H_{IA}(\cdot;\theta_j)$ respectively. We do not take a stance on how $H_{BD}(\cdot;\cdot)$ and $H_{IA}(\cdot;\cdot)$ relate to each other. A type θ_j firm has profit function $\pi_T(\cdot;\theta_j)$ and pays entry cost K_T to enter, where $T \in \{BD, IA\}$. While we will use the notation θ_j throughout, note that type can be replaced by any of the extended types from before, e.g., (θ_j, ϵ_j) or $\boldsymbol{\theta}_j$. A firm who enters will earn profits (net of entry costs) equal to

$$f_T\left(\mu_{BD}, \mu_{IA}\right) \cdot \pi_T^*(\theta_j) - K_T,$$

where $\pi_T^*(\theta_j) = \max_a \pi_T(a;\theta_j)$ and f_T is a share function that is decreasing in both the proportion of broker-dealers who enter and the proportion of RIA firms who enter. An equilibrium is defined to be a pair (μ_{BD}^*, μ_{IA}^*) such that

$$H_T\left(\mathcal{E}_T(\mu_{BD}^*(K_{BD}, K_{IA}), \mu_{IA}^*(K_{BD}, K_{IA}), K_T)\right) = \mu_T^*(K_{BD}, K_{IA})$$

for $T \in \{BD, IA\}$, where $\mathcal{E}_T\left(\mu_{BD}, \mu_{IA}, K_T\right)$ is the set of firms of type T who would enter if they believe the share of broker-dealers who enter to be μ_{BD}, the share of RIA firms who enter is μ_{IA}, and the entry cost of type T is K_T.[29] As

[29]The entry decision for broker-dealers does not directly depend on the entry cost for RIA firms, say, but does indirectly depend on it in equilibrium through the entry decision of RIAs.

before, let the equilibrium set of entrants of type T be $\mathcal{E}_T^*(K_{BD}, K_{IA})$. Fiduciary duty influences neither $\pi_{IA}(\cdot;\theta_j)$ nor K_{IA}. If fiduciary duty operates through a pure fixed cost channel, then K_{BD} increases to K'_{BD}.

Rearrange the types of these firms in decreasing order of profits so that the distribution of types is $[0,1]$. Then, an equilibium consists of

$$(\mu_{BD}^*(K_{BD}, K_{IA}), \mu_{IA}^*(K_{BD}, K_{IA}))$$

such that

$$\begin{aligned} \hat{\pi}_{BD}\left(\mu_{BD}^*, \mu_{IA}^*\right) &\equiv f_{BD}\left(\mu_{BD}^*, \mu_{IA}^*\right) \cdot \tilde{\pi}_{BD}\left(\mu_{BD}^*\right) = K_{BD} \\ \hat{\pi}_{IA}\left(\mu_{BD}^*, \mu_{IA}^*\right) &\equiv f_{IA}\left(\mu_{BD}^*, \mu_{IA}^*\right) \cdot \tilde{\pi}_{IA}\left(\mu_{IA}^*\right) = K_{IA}, \end{aligned} \tag{A.1}$$

where $f_T\left(\cdot;\cdot\right)$ is strictly decreasing in both of its terms and captures the competitive effects. Accordingly, the effective profit functions $\hat{\pi}_T(\cdot;\cdot)$ are decreasing in both its arguments.

We impose that cross-price competitive effects are not too strong.[30]

Assumption 1. *Assume*

$$\frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} > \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}}. \tag{A.2}$$

The left-hand side of (A.2) is the product of the sensitivities of effective profits to the own-type competition, and the right-hand side is the sensitivity of profits to cross-type competition. The following example provides some intuition on Assumption 1.

Lemma 3. *Suppose*

$$f_{BD}^{-1}\left(\mu_{BD}, \mu_{IA}\right) = \gamma_{11}\mu_{BD} + \gamma_{12}\mu_{IA} \text{ and } f_{IA}^{-1}\left(\mu_{BD}, \mu_{IA}\right) = \gamma_{21}\mu_{BD} + \gamma_{22}\mu_{IA}.$$

Then, if $\gamma_{11}\gamma_{22} > \gamma_{12}\gamma_{21}$, then Assumption 1 is satisfied.

[30]See Bulow et al. (1985) for an example of a paper where similar conditions are used to impose stability of equilibria in a pricing game.

Proof. Direct computations show that the left-hand side of (A.2) is

$$L \equiv \left[\pi'_{BD}\left(\gamma_{11}\mu_{BD} + \gamma_{12}\mu_{IA}\right) - \pi_{BD} \cdot \gamma_{11}\right] \cdot \left[\pi'_{IA}\left(\gamma_{21}\mu_{BD} + \gamma_{22}\mu_{IA}\right) - \pi_{IA} \cdot \gamma_{22}\right],$$

times a positive constant. Both terms in parentheses are negative, so we can say

$$L > \pi_{BD}\gamma_{11} \cdot \pi_{IA}\gamma_{22}.$$

The right-hand side is

$$\pi_{BD}\gamma_{12} \cdot \pi_{IA}\gamma_{21},$$

times the same positive constant. If $\gamma_{11}\gamma_{22} > \gamma_{12}\gamma_{21}$, we thus have the result. □

Similar calculations show that a sufficient condition for Assumption 1 under more general f involves replacing $\hat{\pi}_T$ by f_T in (A.2). Under Assumption 1, we can prove both uniqueness and intuitive comparative statics.

Lemma 4. *If Assumption 1 holds, then (i) there is a unique solution to* (A.1)*; (ii) holding K_{IA} fixed, the set of broker-dealers who enter under at K_{BD} is a superset of those who enter at $K'_{BD} > K_{BD}$, and (iii) holding K_{IA} fixed, the set of RIA firms who enter under at K_{BD} is a subset of those who enter at $K'_{BD} > K_{BD}$.*

Proof. According to the Gale-Nikaido Theorem, the solution to (A.1) is unique if the matrix

$$\begin{pmatrix} -\frac{\partial\hat{\pi}_{BD}}{\partial\mu_{BD}} & -\frac{\partial\hat{\pi}_{BD}}{\partial\mu_{IA}} \\ -\frac{\partial\hat{\pi}_{IA}}{\partial\mu_{BD}} & -\frac{\partial\hat{\pi}_{IA}}{\partial\mu_{IA}} \end{pmatrix}$$

is a P-matrix. This conditions means all principal minors must be positive. Both diagonal elements are positive since the effective profit is decreasing in the number of entrants of either type. Under Assumption 1, the determinant is positive as well.

To prove (ii) and (iii), take the total derivative of (A.1) with respect to K_{BD}. Then,

$$\begin{pmatrix} \frac{\partial\hat{\pi}_{BD}}{\partial\mu_{BD}} & \frac{\partial\hat{\pi}_{BD}}{\partial\mu_{IA}} \\ \frac{\partial\hat{\pi}_{IA}}{\partial\mu_{BD}} & \frac{\partial\hat{\pi}_{IA}}{\partial\mu_{IA}} \end{pmatrix} \begin{pmatrix} \frac{d\mu_{BD}}{dK_{BD}} \\ \frac{d\mu_{IA}}{dK_{BD}} \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}. \tag{A.3}$$

Solving (A.3) for the derivatives gives

$$\begin{pmatrix} \frac{d\mu_{BD}}{dK_{BD}} \\ \frac{d\mu_{IA}}{dK_{BD}} \end{pmatrix} = \left(\frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} - \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}} \right)^{-1} \begin{pmatrix} \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} & -\frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \\ -\frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}} & \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}. \tag{A.4}$$

Assumption 1 ensures the first term in (A.4) is positive. The elements of the first column are negative and positive, respectively, which completes the argument. □

Thus, as long as cross-type competitive effects are not too strong, we have

$$\mathcal{E}^*_{BD}(K'_{BD}, K_{IA}) \subseteq \mathcal{E}^*_{BD}(K_{BD}, K_{IA}) \text{ and } \mathcal{E}^*_{IA}(K_{BD}, K_{IA}) \subseteq \mathcal{E}^*_{IA}(K'_{BD}, K_{IA}). \tag{A.5}$$

The result in (A.5) is important for two reasons. First, it shows that even in the presence of a set of firms unaffected by the regulation, the prediction that a pure fixed cost channel must shrink the set of broker-dealers remains robust—at least with a reasonable condition on how strongly these firms compete with one another. Accordingly, the predictions on the extrema of advice discussed above will still bear out. Second, it provides predictions about *spillover* effects onto RIAs. In particular, since the set of RIA firms expands (weakly), it must be the case that the best advice offered by them improves and the worst advice becomes worse.

An example similar to the cap from Section VI.C shows that if fiduciary duty operates through an advice channel as well, then it is still possible for the best advice given by broker-dealers to improve. However, as long as the mass of broker-dealers who enters decreases, the mass of RIA firms would weakly increase. Since the base profit functions of the RIA firms do not change, we would still have an expansion in the set of RIAs, meaning that the predictions on the support of the advice will be isomorphic in both channels.

B. Additional Empirical Results (For Online Publication)

B.1. Nationwide Summary Statistics

While the body of the paper focuses on relevant border counties, we provide further summary statistics on all advisers and transactions in the dataset. Table B.1 shows

Table B.1: Summary statistics for all counties

				Percentiles				
	N	Mean	Std.	10%	25%	50%	75%	90%
Adviser-Level Quantities								
Is Broker-Dealer								
FSP Advisers	39,013	0.186						
Contracts per Adviser								
BD	7,244	5.3	8.7	1	1	2	6	12
RIA	31,769	5.5	8.5	1	1	3	6	13
Contract-Level Quantities								
Is Variable Annuity								
BD	38,041	0.774						
RIA	174,479	0.912						
Contract Amounts ($K, 2015)								
BD	38,041	118.8	146.8	23.2	40.2	77.3	143.8	252.3
RIA	174,479	157.7	197.7	34.4	56.1	101.4	197.5	314.3
Client Age								
BD	38.041	61.7	10.4	49	56	62	68	75
RIA	174,479	64.6	9.8	53	59	65	71	77

summary statistics for all advisers in the US between 2013 and 2015 who sell at least one FSP contract. About 19% of advisers are broker-dealers. BDs tend to sell slightly fewer FSP contracts over this time period, amounting to about 5.3 on average compared to 5.5 for RIAs. Half of advisers sell fewer than three contracts in this time period, although there is a sizable tail of advisers selling many more. Conditional on selling an FSP annuity, BDs sell VAs about 77% of the time, while the proportion is somewhat larger for RIAs. Contract amounts are indeed significantly larger for RIAs than BDs, by about $40,000 off a baseline of about $120,000 for BDs. Finally, most of the clients are nearing or slightly past retirement, as would be expected in a market for retirement products. BDs and RIAs tend to have similar clientele, although the average age of clients in RIAs is higher by about 3 years.

Comparing Tables 1 and B.1 shows that restricting to the border limits us to about 10% of the sample in terms of advisers and about 11% in terms of contracts. However, the characteristics of financial advisors and financial transactions are rather representative of the broader US. The proportion of broker-dealers is about 2 pp lower nationally than in the border. Advisers at the border sell a slightly larger number of contracts on average than the typical adviser in the US, although inspection of the quantiles of this distribution suggests that this result may be driven by a longer upper tail of advisers. The probability of a transaction corresponding to a variable rather than a fixed annuity is similar for advisers at the border relative to advisers overall. Contract amounts tend to be slightly lower at the border, a result driven once again by the tail of contracts, and the ages of the client are not appreciably different from the population of clients in the US.

Table B.2 shows summary statistics for characteristics and returns of all transactions. Comparing the means to Table 2 suggests that the products transacted at the border are also comparable to ones transacted nationwide, which may further allay some concerns about whether the products in the main sample are representative.

B.2. Covariate Balance

Our identifying assumption rests on the argument that even though common law fiduciary status of a state may be correlated with average demand in the state, there are no demand discontinuities at the border. For corroborating evidence on this point, we run covariate balance checks for a variety of demographic and economic characteristics. To run these checks, we estimate regressions at the county level of the demographic quantity on a dummy for whether the county has fiduciary duty. We estimate specifications with and without fixed effects and sometimes dropping counties that do not have any transactions from FSP. In all specifications, we restrict to the relevant border. Standard errors are clustered at the state level.

Table B.3 shows the results of these regressions. Each row corresponds to an outcome, and each column (except for the mean columns (3) and (6)) corresponds to a regression. Columns (1) and (2) restrict to counties with at least one transaction from FSP, and run the regression with and without border fixed effects. Column (3) represents the mean of the outcome variable on this sample. Columns (4)–(6) repeat this on the set of all counties in the Discovery dataset, restricted to the border. The takeaway from Table B.3 is that on almost all covariates, we estimate fairly tight zeros on the difference between means for counties with and without fiduciary duty.

Table B.4 shows evidence that there is no differential selection at the border into

Table B.2: Summary statistics for annuities sold by BDs and RIAs, all counties

	BD		RIA	
Characteristic	Mean	Std.	Mean	Std.
(A) Fund Return (%)				
Return-Maximizing	0.160	0.087	0.159	0.088
Equal	0.012	0.011	0.012	0.010
(B) Fund Expense Ratios (%)				
Minimum	0.501	0.021	0.501	0.022
Average	1.279	0.256	1.262	0.239
(C) Fees				
M&E Fee (%)	1.195	0.206	1.109	0.302
Surrender Charge (%)	3.780	1.199	3.072	1.440
(D) # Funds				
All	99.56	36.09	96.79	35.57
High Quality	27.48	11.97	31.59	14.56
Low Quality	35.98	16.64	31.88	19.02
(E) # Equity Styles				
Some High Quality	6.85	2.05	7.30	1.94
Only Low Quality	1.03	1.75	0.83	1.62
(F) # FI Styles				
Some High Quality	4.00	1.02	4.32	1.53
Only Low Quality	3.05	0.28	3.05	0.30
(G) Contract Return (all products)				
Risk-adjusted	0.031	0.013	0.026	0.010
Unadjusted	0.065	0.022	0.064	0.023

Panels (A)–(F) summarize characteristics of transacted VAs. Panel (G) summarizes characteristics of all transacted annuities. In Panel (D), "High Quality" refers to funds rated by Morningstar as 4 or 5 stars, and "Low Quality" refers to funds rated as 1 or 2 stars. In Panels (E) and (F), "Some High Quality" refers to styles covered at least by one high quality fund, and "Only Low Quality" refers to styles convered only by low quality funds.

broker-dealers and registered investment advisers on some limited client dimensions we do observe. In particular, we view the age of the contract holder (at the time of purchase) and whether the client is a cross-border shopper—i.e., the client state is different from the adviser's state of business. We estimate the same regression as in (1), excluding client age fixed effects, with these as the left-hand side varianbles. We find no evidence that there is differential selection by age induced by fiduciary

Table B.3: Covariate balance

	Transactions			Discovery		
	No Border FE (1)	Border FE (2)	Mean (3)	No Border FE (4)	Border FE (5)	Mean (6)
Population (K)	168.61 (230.00)	-105.45 (97.68)	134.03	35.66 (42.48)	28.46 (26.25)	102.55
Median Age	-0.33 (0.80)	0.29 (0.45)	40.69	-0.57 (0.87)	-0.60 (0.43)	41.37
Pop Black (K)	27.37 (38.16)	-17.52 (25.16)	16.17	7.72 (5.04)	7.13** (2.92)	12.57
Pop Hispanic (K)	130.82 (97.45)	0.31 (20.29)	21.96	15.85 (14.57)	12.83 (9.84)	16.48
Median HH Income (K)	0.06 (6.11)	0.70 (1.97)	45.74	1.99 (2.61)	1.23* (0.68)	44.45
Mean HH Income (K)	-1.36 (7.65)	-1.00 (2.88)	59.97	2.26 (3.04)	1.28 (0.86)	58.38
Pct. Unemployment	0.61 (0.81)	-0.55*** (0.20)	9.32	-0.16 (1.06)	-0.08 (0.31)	9.30
Pct. Poverty	-0.17 (1.81)	-1.00 (0.71)	17.34	-0.68 (1.67)	-0.36 (0.50)	17.72
Pct. HH with less than $25k	-0.89 (2.09)	-1.18 (1.11)	28.38	-0.99 (1.96)	-0.52 (0.52)	29.14
Pct. HH with less than $50k	-0.94 (4.10)	-1.33 (1.49)	54.86	-1.82 (2.40)	-1.10* (0.64)	56.11
Pct. HH with less than $75k	-0.28 (4.66)	-0.56 (1.48)	73.15	-1.52 (2.09)	-0.77 (0.61)	74.31
Pct. HH with less than $100k	0.29 (4.26)	0.03 (1.33)	84.46	-1.26 (1.56)	-0.68 (0.48)	85.45
Pct. Pop less than HS	1.53 (1.45)	-0.44 (0.62)	14.50	-0.03 (1.61)	0.36 (0.39)	14.97
Pct. Pop HS	2.31** (0.87)	1.81** (0.87)	32.85	1.66 (1.39)	1.73*** (0.52)	33.68
Pct. Pop BA or Higher	-4.19 (3.07)	-1.99 (1.42)	19.75	-0.35 (1.64)	-0.71 (0.57)	18.65

Covariate balance for various economic and demographic characteristics. Each pair of columns, for each row, corresponds to the results of one regression. The first column in each pair gives the coefficient on the fiduciary duty dummy. All specifications cluster at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

duty. One may also wonder that clients would be willing to travel across the border to a state with fiduciary standards to purchase an annuity from a broker-dealer. This does have difficulties associated with it: for instance, the adviser would have to be licensed in the client's home state (although this is not an especially binding constraint in our dataset, since many advisers are licensed in all states). Columns (3)

Table B.4: Client covariates

	Age of Contract Holder		Cross-Border Shopper		Trans. Amount ($K)	
	(1)	(2)	(3)	(4)	(5)	(6)
DID	-0.197	0.680	-0.013	0.003	4.20	9.23
	(0.833)	(0.521)	(0.028)	(0.029)	(16.71)	(9.95)
FD on BD	-0.200	0.519	0.005	0.021	0.81	4.40
	(0.762)	(0.499)	(0.034)	(0.035)	(15.19)	(9.37)
FD on RIA	-0.003	-0.161	0.018	0.018	-3.39	-4.83
	(0.299)	(0.166)	(0.025)	(0.017)	(5.48)	(3.37)
Firm FE	No	Yes	No	Yes	No	Yes
Mean of Dep. Var	63.8	63.8	0.320	0.320	146.0	146.0
N	22,472	22,451	22,472	22,451	22,472	22,451

Contract-level regression using (1), with age of the contract holder, whether the contract is due to cross-border shopping (client state is different from adviser state), and transaction amount on the left-hand side. All specifications include border fixed effects and contract-month fixed effects but exclude age fixed effects, and Columns (2), (4), and (6) also include firm fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

and (4) show that there is no differential cross-border shopping that induces excess shopping onto the side with fiduciary duty: even if we believe that unobservably different (on sophistication, say) shoppers are the ones engaging in cross-border shopping, this effect is the same across the border. We also see from Columns (5) and (6) that running the same regression with transaction amount of the left-hand side returns statistically insignificant, albeit slightly noisier, coefficients. To the extent that transaction amount is a proxy for consumer income or wealth, this would indicate a lack of differential selection on this consumer characteristic as well. However, we interpret this result with some caution: one might worry that advisers influence the transaction amount, and fiduciary duty might affect how much they try.

B.3. Combining Risk-Adjusted and Unadjusted Returns

One interpretation of risk-adjusted returns is that they correspond to how an individual whose stochastic discount factor prices the factors in the economy would value the annuity. This individual is risk-averse, with a particular risk aversion. An interpretation of unadjusted returns is that they correspond to how much a risk-neutral individual would value the annuity. In the body of this paper, we have estimated returns using one valuation method at a time, with the risk-adjusted valuation being our preferred one given its prevalence in the finance literature.

However, a natural concern may be that valuation methods are heterogeneous. In particular, perhaps an individual who is risk-averse is more likely to buy an FIA rather than a VA. To investigate this, we estimate (1) and allow for heterogenous valuations in the population that may depend on the product purchased. In particular, we assume that a client can value each annuity either using the risk-adjusted method ("is risk-averse") or the unadjusted method ("is risk-neutral"). On the side without fiduciary duty, we assume that a proportion $\eta_{VA} \in [0, 1]$ of the clients who purchase VAs are risk-averse and the remainder are risk-neutral; a proportion $\eta_{FA} \in [0, 1]$ of clients who purchase FIAs are risk-averse. Then, we value each VA on the side without fiduciary duty as a convex combination of the risk-adjusted and unadjusted returns, with a weight η_{VA} times the risk-adjusted return; we value FIAs analogously. Given the assumption that populations do not change on either side of the border, we compute the proportions η'_{VA} and η'_{FA} on the side with fiduciary duty so that the total proportions of risk-averse individuals is constant on both sides of the border,[31] and we use these proportions on the side with fiduciary duty.

We allow η_{VA} and η_{FA} to independently vary over a fine grid on $[0, 1]$ and compute the difference-in-differences estimate from (1). Of course, $\eta_{VA} = \eta_{FA} = 1$ corresponds to the risk-adjusted result and $\eta_{VA} = \eta_{FA} = 0$ corresponds to the unadjusted one, but note that using other combinations of these parameters does not necessarily imply that the estimate lies between the ones in Table 3. Nevertheless, even with this flexibility, the difference-in-differences estimates are robustly positive. Indeed, over the entire range of parameters (η_{VA}, η_{FA}), the lowest estimate that we find is 18 bp, and the 10$^{\text{th}}$ percentile is 24 bp, both of which are statistically significant at the 5% level. This exercise provides credence that our main results are robust to some degree of heterogeneity in valuation methodologies.

[31] That is, we impose that $\eta'_{VA} \cdot \Pr(\text{purchase VA with FD}) + \eta'_{FA} \cdot \Pr(\text{purchase FIA with FD}) = \eta_{VA} \cdot \Pr(\text{purchase VA without FD}) + \eta_{FA} \cdot \Pr(\text{purchase FIA without FD})$. We find (η'_{VA}, η'_{FA}) to minimize the distance to (η_{VA}, η_{FA}) subject to satisfying the aforementioned equality.

Table B.5: Number of firms, by footprint

	(1) Local	(2) Multistate	(3) Regional	(4) National
All Firms	-0.133*	-0.0657	0.0036	-0.0398
	(0.0702)	(0.0495)	(0.0577)	(0.0580)
BD Firms	-0.115*	-0.0277	-0.0190	-0.0645
	(0.0681)	(0.0324)	(0.0485)	(0.0679)
RIA Firms	-0.0225	-0.0483	0.0173	-0.0296
	(0.0175)	(0.0485)	(0.0483)	(0.0639)

Regressions of the number of each type of firm (using the $\log(x+1)$ transformation) on fiduciary status, county controls (log population, log median household income, and median age), border fixed effects, and standard errors clustered at the border. Each coefficent shown comes from a separate regression, and the number in the table is the coefficient on the fiduciary dummy. All regressions have $N = 411$ observations. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

B.4. Entry Rates by Firm Categories

We next study whether fiduciary duty induced a compositional shift even within broker-dealer firms, focusing on firm footprint. We use Discovery Data's classification into local, multistate, regional, and national firms. The rationale behind this investigation is two-fold. First, a natural concern is that local broker-dealers may be more susceptible to increases in costs induced by fiduciary duty—perhaps because they lack the legal and compliance departments to deal with the regulatory costs of such laws. Second, if different groups of broker-dealer firms sustain different increases in fixed costs, then even under a pure fixed cost channel we may see an expansion in advice from broker-dealers. However, Section VI.B shows that this expansion cannot happen without an expansion in at least of the groups. As such, the effect of fiduciary duty on entry for a natural grouping of broker-dealer firms is a relevant robustness check for the testable predictions of the model.

Table B.5 presents results of regressions where the left-hand side is (the log of one plus) the count of the number of firms of each footprint, and the right-hand side has the same set of variables the regressions in Table 4. The numbers presented in the table are the coefficient of the fiduciary dummy in separate regressions. The first row shows that among all firms, the ones that are affected most strongly by regulation are the ones with a local footprint, with the number of local firms dropping by about

13%. Consistent with the notion that the direct incidence falls on broker-dealers, the second row shows that local broker-dealers are affected strongly. The third row suggests no strong compostional effect among RIA firms. We should note, however, that the compositional shift we identify among broker-dealers is due to "exit" of firms: we do not see any evidence that the decrease in the number of local broker-dealers induces *more* regional or national broker-dealers to enter.

B.5. Estimates with Firm Fixed Effects

Table B.6 reports estimates of (1), but adding firm fixed effects, for all outcomes studied in this paper. A prediction of the fixed cost channel is that within-firm behavior should not change as a function of fiduciary duty. While results are underpowered, we broadly find that point estimates of within-BD changes are large—often 1/2 to 2/3 of the change within firm fixed effects—and often statistically significant. They are (almost) uniformly in the same direction as the total effect. These results provide suggestive evidence in favor of an advice channel.

C. Computating Investment Returns (For Online Publication)

In this section, we detail how we compute investment returns for the investment options (often called *subaccounts*) available to the clients and decide on the set of investment allocations from which the clients can choose. We also discuss how we aggregate historical information from FIA rate sheets. These inputs feed into the calculation of the net present values computed in Appendix D.

C.1. Computing Returns for Variable Annuities

For each investment option in the variable annuity dataset, we can match by name to CRSP Survivorship-Bias-Free US Mutual Fund Database. CRSP provides a permanent fund number, which is invariant to name changes, which we then track to find montly net asset values dating from January 1, 1990. We compute monthly returns from changes in this net asset value instead of using CRSP's monthly return, since variable annuity subaccounts do not reinvest dividends on behalf on the annuitants:

Table B.6: Characteristics of products transacted, with firm fixed effects

	Returns				Expense Ratio		Fund Returns		Fees	
	Risk-Adj. (3.1)	Unadj. (3.2)	$\mathbb{1}$[VA] (1)	10^{th} Perc. (2)	Minimum (3)	Average (4)	Optimal (5)	Equal (6)	M&E (7)	Surr. Chg. (8)
DID	0.0005	0.0029	-0.041	0.411	-0.004	0.042**	0.0143	0.0015*	-0.021**	-0.016
	(0.0010)	(0.0019)	(0.031)	(0.334)	(0.003)	(0.019)	(0.0087)	(0.0008)	(0.010)	(0.167)
FD on BD	0.0004	0.0022	-0.027	0.288	-0.004*	0.044**	0.0137*	0.0013	-0.014*	-0.066
	(0.0009)	(0.0017)	(0.034)	(0.305)	(0.002)	(0.018)	(0.0076)	(0.0008)	(0.008)	(0.130)
FD on RIA	-0.0001	-0.0001	0.015	-0.123	-0.000	0.002	-0.0005	-0.0002	0.007	-0.050
	(0.0005)	(0.0005)	(0.013)	(0.161)	(0.00)	(0.009)	(0.0034)	(0.0005)	(0.008)	(0.055)
Base Mean	0.028	0.064	0.878	2.610	0.501	1.263	0.159	0.012	1.088	3.108
N	22,451	22,451	22,451	22,451	19,711	19,711	19,711	19,711	19,711	19,711
	# Funds			# Equity Styles		# FI Styles				
	All (9)	$\geq$ 4 Stars (10)	$\leq$ 2 Stars (11)	High Q. (12)	Only Low Q. (13)	High Q. (14)	Only Low Q. (15)			
DID	5.75	2.45*	1.74	0.393*	-0.321	0.050	-0.066***			
	(3.48)	(1.36)	(1.45)	(0.224)	(0.215)	(0.091)	(0.017)			
FD on BD	6.81**	2.14*	2.60*	0.367*	-0.331*	-0.008	-0.067***			
	(3.28)	(1.27)	(1.34)	(0.206)	(0.194)	(0.060)	(0.017)			
FD on RIA	1.06	-0.31	0.86	-0.026	-0.009	-0.058	-0.002			
	(1.63)	(0.41)	(0.93)	(0.083)	(0.100)	(0.055)	(0.009)			
Base Mean	96.81	32.05	31.34	7.216	0.864	4.408	3.028			
N	19,711	19,711	19,711	19,711	19,711	19,711	19,711			

Estimates of (1) for various product characteristics. Columns (3.1), (3.2), (1), and (2) use the set of all annuities transacted in the border, while the other columns restrict to variable annuities. All specifications include firm fixed effects. Columns (3.1) and (3.2) should be compared to Columns (1) and (2) of Table 3, and all other columns should be compared to the corresponding columns in Table 5. Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

reinvested dividends accrue to the firm. (One can check that the computed number is identical to the CRSP monthly return less dividends reinvested.) From CRSP, we also collect historical monthly risk-free rates (proxied by the one-month treasury), the excess return of the market, and the Fama-French factors, at the monthly level from January 1990.

We compute returns and covariances using two main methods. These estimates then feed into the computation of the optimal portfolios.

Stochastic Discount Factor. The first is employing a linear factor model for both the stochastic discount factor and the returns of the annuity. In this process, we first need an estimate of the stochastic discount factor m_t. We model $m_t = a - \sum_i b_i f_i$ where f_i consists of just the excess return of the S&P index (over the risk-free rate) and the size premium (small minus big) and the value premium (high minus low) in the three-factor case. In the one-factor case, we simply use the excess return of the S&P index. We then posit a risk-free rate r^* that we will use to value the variable annuity. Then, we use the restrictions $\mathbb{E}[m(1+r^*)] = 1$ and $\mathbb{E}[mf_i] = 0$ for all i to estimate a and b_i, by replacing the expectations with their empirical counterparts. We convert the monthly returns to quarterly ones to compute a quarterly discount factor. In practice, we use all groups of three consecutive months as a separate observation of the quarter.

We then must then value the funds. We use a factor model for the returns as well, positing that for fund j in quarter t

$$r_{jt} - r_t = \alpha_j + \sum_i \beta_{ji} f_{it} + \epsilon_{jt}, \tag{C.1}$$

where r_t is the observed risk-free rate in quarter t. We can estimate α_j and β_{ji} through OLS, and we also recover a distribution of abnormal returns ϵ_{jt} for the quarters where we observe returns of the fund. While almost all estimates α_j are negative—consistent with these funds having higher than normal expense ratios and sometimes withholding dividends—we estimate some funds to have positive (but especially small) α.

Using these estimates, we can compute an (i) expected discounted mean for each fund and (ii) covariance matrix for all funds that are options. We estimate the mean as simply its empirical counterpart:

$$\frac{1}{T}\sum_t \hat{m}_t \left(r^* + \hat{\alpha}_j + \sum_i \hat{\beta}_{ji} f_{it} \right), \tag{C.2}$$

where the sum ranges over all T quarters starting from 1990, r^* is the *posited* discount rate to be used for the value calculations, and the hats denote the estimates computed from above. Note that in this version of the computation, $\hat{\beta}$ do not play a role in this calculation by construction, and $\hat{m}_t$ was chosen so that their product with the discount factor averaged to 0.

The covariance matrix is computed in two steps. We first compute the empirical covariance matrix of the distribution of the terms in the summand in (C.2) across funds j. Call this $\hat{V}_1$. We then compute the empirical covariance matrix of the abnormal returns, and we denote this $\hat{V}_\epsilon$. Since funds may not have full overlap (as they enter into the market at different times), we compute the elements of the covariance matrix pairwise, which means that $\hat{V}_\epsilon$ is not guaranteed to be positive semidefinite. Direct expansion of the terms for the covariance of the discounted returns shows that the total covariance matrix is $\hat{V} \equiv \hat{V}_1 + \mathbb{E}[\hat{m}^2]\hat{V}_\epsilon$. Since this expression need not be positive semidefinite in finite samples (though it often is), our final step involves finding the closest positive semidefinite matrix to it, to convert it to a valid covariance matrix. Letting $QUQ' \equiv \hat{V}$ denote the Schur decomposition of $\hat{V}$, we generate the matrix U^+, which replaces all negative elements of U (which will be a diagonal matrix in this case) with zeros. We then use $\hat{V}^+ \equiv QU^+Q'$ as the estimated variance-covariance matrix.[32]

Risk-Free Rate. We run another version of the computations in which the agent discount returns not via the stochastic discount factor but via the posited risk-free rate. In this situation, we follow all the above steps but simply impose $m = 1/(1+r^*)$. In particular, we still model the returns using the factor structure: given that some funds

[32]We have checked for numerical issues by using a semidefinite solver, which achieves the same solution through a different algorithm. Furthermore, the norm of $\hat{V}^+ - \hat{V}$ is usually very small, suggesting this procedure does not change the matrix appreciably—as one would hope.

were only introduced after the crisis and others have endured periods of downturns as well, the raw means and variances would introduce substantial bias.

C.2. Optimal Portfolio Allocation for Variable Annuities

Investment restrictions partition the set of funds available into groups and place minimums and maximums on the shares of assets that can be placed in each group. If s is the vector of shares of each fund, this effectively amounts to a linear restriction $Ms \geq m$. The only portfolios a client can choose are ones that satisfy this restriction. If r is the vector of estimated returns, the maximum possible return is simply the linear program

$$\max_s r \cdot s \text{ s.t. } Ms \geq m \text{ and } s \cdot \mathbb{1} = 1, \tag{C.3}$$

if $\mathbb{1}$ is a vector of ones. This program can be solved efficiently; we use Gurobi.

However, the client will not necessarily pick the mean-maximizing return. Moreover, the set of possible allocations is still infinite, so we cannot solve the dynamic programming problem over this entire set. Instead, we allow the client to choose portfolios on the mean-variance frontier. The intuition is simple: facing two portfolios with the same volatility, the client should pick the one with the higher mean. Thus, for a fixed variance, we could find the highest mean attainable and thus compute an "extended" efficient frontier. Alternatively, for each mean, we can compute the lowest and higher variance attainable. Note that due to the convexity of the contract, the client may prefer higher variance. However, due to different funds having different returns, high variance may come at a cost, just as low variance comes with a cost.

We can solve for the typical variance-minimizing portfolios as

$$\min_s s'\hat{V}^{+}s \text{ s.t. } Ms \geq m,\ r \cdot s \geq \bar{r}, \text{ and } s \cdot \mathbb{1} = 1, \tag{C.4}$$

for a fine grid of minimum returns $\bar{r}$ from the minimum possible return to the maximum one (i.e., the solution to (C.3)). This is a convex quadratic program and can also be solved efficiently by Gurobi. The analoguous variance-maximizing program is identical but with the min replaced by a max. This problem is non-convex, but we find using KNITRO's multistart that we can reliably and efficiently find a solution.

In the case where α is set to a constant and we use a stochastic discount factor, all funds return the same mean. In these cases, we simply find the minimum and maximum variance attainable and allocations that attain them. Since the set of attainable portfolios is convex,[33] all variances between the extremes can be attained. We then use nine equally spaced allocations between the two extremes as additional elements of the choice set.

C.3. Computing Rates for Fixed Indexed Annuities

In this paper, we compute returns in a world with a one-year risk-free return of 3%. The factor models for returns account for this risk-free rate directly. However, rates for fixed indexed annuities are set for different crediting strategies, and they are changed monthly as the interest rate changes. To impute rates for these crediting strategies in the return calculations, we interpolate based on the relationship between the historical rates for different crediting strategies for a particular annuity and treasury rates.

Fix a product. The procedure follows four steps.

1. Rates for different crediting strategies for a product are strongly (linearly) correlated, and we wish to use this relationship to improve the accuracy of our predictions of rates. To do so, we "normalized" rates to the rate that would be provided by the fixed crediting strategy, as all products in our dataset have a fixed crediting strategy. That is, for each crediting strategy c and month m, we regress the fixed rate r^x_m on r^c_m. We then compute $\hat{r}^{xc}_m$, the predicted value of the fixed rate implied by the crediting strategy c in month m.

2. We regress r^{xc}_m on the five-year treasury rate: observations are at the month

[33]The caveat to this statement is that some products have two possible investment restrictions: clients can choose funds that satisfy one set or the other. In such situations, the set of possible portfolios need not be convex. However, we have checked that we do not have any situations where the set of attainable variances do not overlap, i.e., the minimum in one set is never larger than the maximum in the other. Thus, the same spanning property holds. In other situations, we simply take account of these two sets by solving the minimization or maximization problem separately for each set of restrictions.

level, and we stack the regression across all crediting strategies c provided by the product. This regression then lets us predict the rate provided by the fixed crediting strategy for any value of the five-year treasury rate.

3. We compute the five-year rate implied by a one-year rate of 3%, averaging across historical realizations of the yield curve. To do so, we regress the five-year rate r_m^5 on the one-year rate r_m^1, where each observation is a month (starting at 1990). We estimate an implied rate of 3.67%. We then plug this estimate into the regression from Step 2 to impute the rate provided by the fixed crediting strategy for this product.

4. To compute the rates for other strategies, we run the reverse of the regression from Step 1, i.e., r_m^c on r_m^x. We then use the predicted value at the imputed rate for the fixed strategy from Step 3.

We have experimented with variations of this procedure. The results in this paper are robust to modifications such as dropping Step 3 (so that the rates are predicted at a five-year rate of 3%) or using a ten-year treasury rather than the five-year rate.

D. Computations of Net Present Values (For Online Publication)

This appendix section presents the detailed explanation of how variable and fixed income annuities are valued. It is divided into three subsections. The first introduces notation and presents relevant definitions. The second derives how to value a variable annuity contract with a minimum withdrawal living benefit and an account value death benefit, the most prevalent contract in our dataset. The third modifies this derivation for variable annuities and fixed indexed annuities.

D.1. Definitions and Contract Rules

When a variable annuity or a fixed indexed annuity contract is signed, the invested amount becomes the contract value at period 0, c_0. Contracts with living benefit riders also generate an income base b_0, which is equal to c_0 at this moment, but will typically diverge over time. Let $c_t \in \mathbb{R}^+$ denote the contract value in period t and

$b_t \in [c_0, \bar{b}]$ denote the income base in period t. Contract values are bounded below by zero, as annuitants cannot go into debt with the insurance company, and income bases are bounded above by an amount set by the insurance company (in our data, $10 million dollars) and below by the original contract value.

Let $\mathcal{I}_t$ denote the set of feasible asset allocations available to the annuitant in period t. For variable annuities, this is restricted both by the set of funds available given the chosen contract and rider, and by the investment restrictions imposed by the contract-rider combination. For fixed indexed annuities, this corresponds to the set of crediting strategies the annuitant can choose from. Let $i_t \in \mathcal{I}_t$ denote a vector of chosen allocations in period t, and let $r_{t+1}(i_t)$ denote the return of that asset allocation, which is realized in period $t+1$. In some cases, crediting strategies for fixed indexed annuities are realized in longer horizons. For expositional clarity, we will ignore this for now and return to this issue below.

Variable and fixed indexed annuity contracts may have a fixed fee f_t, which for some contracts is waived for contract values above $\bar{f}$ and for all contracts is waived after 15 years, and a variable fee on the income base v^b. Variable annuity contracts also have a variable fee v^c on the contract value. In what follows, $v^c = 0$ for all fixed indexed annuity contracts, let $\bar{f} = \infty$ if the contract does not waive the annual fee for high contract values, and let $f_t = 0$ after fifteen contract years.

Contracts with a minimum withdrawal living benefit rider have two additional features that affect transitions of the income base and of the contract value must be introduced. First, after a given age annuitants have the option of withdrawing the Guaranteed Annual Income (GAI) amount, which is equal to the income base times the relevant GAI rate for the period, $g_t \in \{g_1, ..., g_G\}$. We detail which GAI rate is available to the annuitant in each period below, as it is a complicated function of the sequence of choices made in the past. Let $w_t \in \{0, 1\}$ denote whether the annuitant decides to withdraw the GAI amount in period t, so that the GAI withdrawal amount is $w_t \cdot g_t \cdot b_t$. Second, for the first E years of the contract, known as the enhancement period, the income base is guaranteed to grow at least by the enhancement rate e. Moreover, if certain conditions are met, an additional E years of enhancement rate eligibility can be earned. We denote the enhancement rate in period t by $e_t \in \{0, e\}$. Typical values of the enhancement period and enhancement rate during our sample period are 10 years and 5%, respectively.

Transitions of the contract value and the income base are governed by the following equations:

$$\tilde{c}_t = c_t - \left(w_t g_t + v^b\right) b_t - f_t \cdot 1[c_t < \bar{f}]$$
$$c_{t+1} = \max[(1 + r_{t+1}(i_t) - v^c(i_t))\tilde{c}_t, 0]$$
$$b_{t+1} = \begin{cases} \min\left[\max\left[(1+e_t)\, b_t, \tilde{c}_t\right], \bar{b}\right] \text{ if } a_t < \bar{a} \\ b_t \text{ if } a_t \geq \bar{a} \end{cases} .$$

Define $\tilde{c}_t$ as the end-of-period contract value, equal to the contract value minus the annual fee, the fee on the income base, and the GAI withdrawal amount. In an abuse of notation, we set $w_t g_t = 0$ in years where GAI withdrawals are not available. The next period contract value is equal to the end of period contract value times the net rate of return, or the difference between the realized return on investments and the contract fee. As mentioned earlier, contract value is bounded below by zero. Finally, in every period where the annuitant's age (a_t) is less than the contract's maximum purchase age, $\bar{a}$, the income base is equal to the maximum of the contract value and the enhanced income base, provided this amount is below the maximum income base. Because of this transition rule, the income base cannot fall below the initial investment amount. After the contract's maximum purchase age, the income base is locked in and cannot change. Note that GAI withdrawals decrease the contract value but do not decrease the income base, and that they continue even when contract value equals zero.

On a period where contract value exceeds the value of the enhanced income base and no GAI withdrawals take place, the contract is said to have "stepped up." After a step up, the contract is eligible for E more years of enhancement. Let s_t denote the number of years since the last step up. Then

$$s_0 = 0$$
$$s_{t+1} = s_t \cdot 1\left[b_{t+1} \neq \tilde{c}_t \text{ or } w_t = 1\right] + 1$$
$$e_t = e \cdot 1\left[s_t \leq E\right] \cdot 1\left[a_t < \bar{a}\right].$$

The GAI rate available in period t is a function of the age at which the first GAI withdrawal occurs, a^{first}. GAI withdrawals cannot be taken before a certain age a_0, typically 55, and they are increasing in the age of first withdrawal, until either 70 or 75. The contract specifies a map $G\left(a^{first}\right) : \{a_0, ..., \bar{a}\} \rightarrow \{g_1, ..., g_G\}$ from all possible ages at first withdrawal to GAI rates. For example, a contract might specify that an annuitant who takes a GAI withdrawal for the first time at age 60 receives a 3% GAI rate, while they would receive a 5% rate if they wait until age 75. Annuitants are locked in to the GAI rate at the age of first withdrawal, unless a step up takes place at a later age with a higher GAI rate. Then the GAI rate available in period t is

$$g_t = \begin{cases} \emptyset & \text{if } a_t < a_0 \\ g_{G(a_t)} & \text{if } a_t \leq a^{first} \\ g_{G(a_{t-1})} & \text{if } a_t > a^{first} \text{ and } \tilde{b}_{t-1} = \tilde{c}_{t-1} \\ g_{t-1} & \text{if } a_t > a^{first} \text{ and } \tilde{b}_{t-1} \neq \tilde{c}_{t-1} \end{cases}.$$

In summary, the set of relevant state variables in period t is (c_t, b_t, s_t, g_t), and the annuitant's control variables are whether to take a GAI withdrawal w_t and the investment allocation i_t. Finally, annuitants can withdraw the contract value at any time, receiving $c_t \cdot (1 - d_t)$, where d_t is the surrender charge in period t, or they can annuitize the contract value, receiving an expected present discounted value of the annuity stream $z(a_t, c_t)$. Note that both full withdrawal of the contract value and annuitization induces the loss of the guaranteed annual income.

Defining μ_t as the probability of being alive in period t conditional having lived to period $t-1$, the value of a contract in period t is equal to

$$V_t\left(c_t, b_t, s_t, g_t\right) = \max\left[\max_{(w_t, i_t)} w_t \cdot g_t \cdot b_t + E\left[\delta\left(\mu_{t+1} E\left[V_{t+1}\left(c_{t+1}, b_{t+1}, s_{t+1}, g_{t+1}\right)\right]\right)\right.\right.$$
$$\left.\left. + \left(1 - \mu_{t+1}\right)\beta E\left[c_{t+1}\right]\right], (1 - d_t)c_t, E[PDV(z(a_t, c_t))]\right]$$

D.2. Solving for the Value of Variable and Fixed Indexed Annuity Contracts with a Minimum Withdrawal Living Benefit Rider

Assume that the probability of death in period T is 1, and that annuitants value a dollar left after their death by β. In our calculations, we set $\beta = 1$. Then in period $T-1$ the continuation value of the contract is $\beta E[c_T]$. Moreover, since $a_{T-1} > \bar{a}$, the income base and GAI rate are locked in (at $b_{\bar{t}}$ and $g_{\bar{t}}$, respectively), so the years since last step up are irrelevant. Then the problem in period $T-1$ is

$$V_{T-1}\left(c_{T-1}, b_{\bar{t}}, g_{\bar{t}}\right) = \max\left[\left(\max_{(w_{T-1}, i_{T-1})} w_{T-1} \cdot g_{\bar{t}} \cdot b_{\bar{t}} + \beta \cdot E\left[\delta \cdot c_T\right]\right), \right. \\ \left. z(a_{T-1}, c_{T-1}), (1 - d_{T-1}) \cdot c_{T-1}\right] \quad \text{(D.1)}$$

subject to

$$\begin{aligned} E\left[\delta c_T\right] &= E\left[\delta \max\left[\left(1 + r_T\left(i_{T-1}\right) - v_T^c\right)\tilde{c}_{T-1}, 0\right]\right] \\ \tilde{c}_{T-1} &= c_{T-1} - \left(w_{T-1} g_{\bar{t}} + v_{T-1}^b\right) b_{\bar{t}} - f_{T-1} \cdot 1[c_{T-1} < \bar{f}]. \end{aligned}$$

In practice, we are using the 2012 Individual Annuity Mortality Basic Table, from the Society of Actuaries, for death probabilities. This sets $T = 121$. Additionally, contracts cannot be annuitized after age 99, so annuitization is not an option in $T-1$. Rather than introducing notation to keep track of when annuitization is available, we will always include it as an option, and implicitly set $z(a_{T-1}, c_{T-1}) = 0$ whenever it is not. Furthermore, since the maximum purchase age is 85 for variable annuities and 96 for fixed indexed annuities, and surrender periods are never more than 10 years long, in practice $d_{T-1} = 0$. We will also keep surrender charges in the notation and set them to 0 when the surrender period has expired.

To solve for the value of continuing with the contract, we discretize both the set of feasible investments $\mathcal{I}_t$, and the space of $(c_{T-1}, b_{\bar{t}})$. For every element in the contract value - income base grid, (c^k, b^k), and conditional on the GAI rate, we find the asset allocation that yields the highest expected present discounted value for both the case where the annuitant decides to take GAI withdrawals and where they do not. Taking the maximum over the utilities under both withdrawal strategies and over annuitization and full surrender yields $V^*_{T-1}(c^k, b^k, g_{\bar{t}})$, the value of following the optimal withdrawal and investment strategy after arriving at period $T-1$ with contract value c^k and income base b^k. We interpolate linearly over the (c_{T-1}, b_{T-1}) space to obtain $\hat{V}^*_{T-1}(c_{T-1}, b_{\bar{t}}, g_{\bar{t}})$, the value function in period $T-1$ for all possible combinations of contract value, income base, and GAI rate. In period $T-2$, we then solve

$$\begin{aligned} V_{T-2}\left(c_{T-2}, b_{\bar{t}}, g_{\bar{t}}\right) = \max \Bigg[& \max_{(w_{T-2}, i_{T-2})} w_{T-2} \cdot g_{\bar{t}} \cdot b_{\bar{t}} \\ & + \left(\mu_{T-1} \cdot E\left[\delta \hat{V}^*_{T-1}(c_{T-1}, b_{\bar{t}}, g_{\bar{t}})\right] + (1-\mu_{T-1}) \cdot E[\delta c_{T-1}]\right), \\ & z(a_{T-2}, c_{T-2}), (1-d_{T-2}) \cdot c_{T-2} \Bigg] \end{aligned} \tag{D.2}$$

subject to

$$\begin{aligned} E\left[\delta c_{T-1}\right] &= E\left[\delta \max\left[\left(1 + r_{T-1}\left(i_{T-2}\right) - \upsilon^c_{T-1}\right)\tilde{c}_{T-2}, 0\right]\right] \\ \tilde{c}_{T-2} &= c_{T-2} - \left(w_{T-2} g_{\bar{t}} + \upsilon^b_{T-2}\right) b_{\bar{t}} - f_{T-2} \cdot 1[c_{T-2} < \bar{f}]. \end{aligned}$$

Again, discretizing over $(c_{T-1}, b_{\bar{t}})$ and over the set of feasible investments allows us to find $V^*_{T-2}(c^k, b^k, g_{\bar{t}})$, the value of following the optimal withdrawal and investment strategy after arriving at period $T-2$ with contract value c^k and income base b^k, and linear interpolation yields $\hat{V}^*_{T-2}(c_{T-2}, b_{\bar{t}}, g_{\bar{t}})$. We continue this process recursively until we reach the maximum purchase age in period $\bar{t}$, where we obtain $\hat{V}^*_{\bar{t}}(c_{\bar{t}}, b_{\bar{t}}, g_{\bar{t}})$.[34]

In period $\bar{t}-1$, the annuitant can still step up or enhance the income base, and a step up increases the GAI rate to its highest possible level, if the annuitant is not there already. Moreover, having one or more remaining enhancement years is irrelevant. Then, the problem is

[34]Note that when contract value equals zero, we can obtain the value of the problem analytically, as annuitization and withdrawal are not available and the income base is fixed. As a result, $V^*_{\bar{t}}(0, b_{\bar{t}}, g_{\bar{t}}) = g_{\bar{t}} \cdot b_{\bar{t}} \cdot \left(1 + \sum_{\tau=\bar{t}+1}^{T} \delta^{\tau-\bar{t}} \prod_{\tau'=\bar{t}+1}^{\tau} \mu_{\tau'}\right)$.

$$
\begin{aligned}
V_{\bar{t}-1}\left(c_{\bar{t}-1}, b_{\bar{t}-1}, s_{\bar{t}-1}, g_{\bar{t}-1}\right) = \max \Bigg[& \max_{\left(w_{\bar{t}-1}, i_{\bar{t}-1}\right)} w_{\bar{t}-1} \cdot g_{\bar{t}-1} \cdot b_{\bar{t}-1} \\
& + \left[\mu_{\bar{t}} \cdot E\left[\delta \hat{V}_{\bar{t}}^{*}\left(c_{\bar{t}}, b_{\bar{t}}, g_{\bar{t}}\right)\right] + \left(1-\mu_{\bar{t}}\right) \cdot \beta \cdot E\left[\delta c_{\bar{t}}\right]\right], \\
& z(a_{\bar{t}-1}, c_{\bar{t}-1}), (1-d_{\bar{t}-1}) \cdot c_{\bar{t}-1}) \Bigg] \qquad \text{(D.3)}
\end{aligned}
$$

subject to

$$
\begin{aligned}
E\left[\delta c_{\bar{t}}\right] &= E\left[\delta \max\left[\left(1+r_{\bar{t}}\left(i_{\bar{t}}\right)-v_{\bar{t}}^{c}\right) \tilde{c}_{\bar{t}-1}, 0\right]\right] \\
\tilde{c}_{\bar{t}-1} &= c_{\bar{t}-1} - \left(w_{\bar{t}-1} g_{\bar{t}-1} + v_{\bar{t}-1}^{b}\right) b_{\bar{t}-1} - f_{\bar{t}-1} \cdot 1[c_{\bar{t}-1} < \bar{f}] \\
b_{\bar{t}} &= \min\left[\max\left[\left(1+e_{\bar{t}-1}\right) b_{\bar{t}-1}, \tilde{c}_{\bar{t}}\right], \bar{b}\right] \\
g_{\bar{t}} &= \begin{cases} g_{A\left(a_{\bar{t}-1}\right)} \text{ if } b_{\bar{t}} = \tilde{c}_{\bar{t}-1} \text{ or } a^{first} = a_{\bar{t}} \\ g_{\bar{t}-1} \text{ otherwise} \end{cases} .
\end{aligned}
$$

To increase numerical precision, we transform the state space into a single dimension by working with $\frac{CV_{\bar{t}-1}}{IB_{\bar{t}-1}}$ as the state variable. Note that an individual who continues receiving GAI withdrawals at age $\bar{t}$ receives $CV_{\bar{t}} \cdot \frac{CV_{\bar{t}}}{IB_{\bar{t}}}^{-1} \cdot NPV(1, g_{\bar{t}})$, where $NPV(1, g_{\bar{t}})$ is the NPV of receiving $g_{\bar{t}} \cdot 1$ dollars as an annuity, while an individual who withdraws the contract value receives $\frac{CV_{\bar{t}}}{IB_{\bar{t}}} \cdot IB_{\bar{t}}$. Therefore, $\hat{V}_{\bar{t}}^{*}(\frac{CV_{\bar{t}}}{IB_{\bar{t}}}, g_{\bar{t}}) = \max\left[NPV(1, g_{\bar{t}}), \frac{CV_{\bar{t}}}{IB_{\bar{t}}}\right]$, and $\hat{V}_{\bar{t}}^{*}(c_{\bar{t}}, b_{\bar{t}}, g_{\bar{t}}) = IB_{\bar{t}} \cdot \hat{V}_{\bar{t}}^{*}(\frac{CV_{\bar{t}}}{IB_{\bar{t}}}, g_{\bar{t}})$.

We discretize the $\frac{CV}{IB}$ space and solve for the optimal asset allocation for every combination of GAI rate-enhancement availability-withdrawal decision. Taking the maximum over withdrawal decisions, and comparing to the value of both annuitization and full withdrawal yields $V_{T-2}^{*}(\frac{CV}{IB}^{k}, s_{\bar{t}-1}, g_{\bar{t}})$, the value at each grid point for all combinations of GAI rates and years since the last step up. As argued earlier, in this period $V_{T-2}^{*}(\frac{CV}{IB}^{k}, 1, g_{\bar{t}}) = V_{T-2}^{*}(\frac{CV}{IB}^{k}, y, g_{\bar{t}}) \, \forall y \in \{2, ..., E\}$, as the income base is locked in period $\bar{t}$. Linear interpolation yields $\hat{V}_{\bar{t}-1}^{*}\left(\frac{CV}{IB}^{k}, s_{\bar{t}-1}, g_{\bar{t}-1}\right)$.

The general recursive formulation for earlier periods is

$$
V_{t}\left(c_{t}, b_{t}, s_{t}, g_{t}\right) = \max\left[\max_{\left(w_{t}, i_{t}\right)} w_{t} \cdot g_{t} \cdot b_{t} + \cdot \left[\mu_{t} \cdot E\left[\delta \hat{V}_{t+1}^{*}\left(c_{t+1}, b_{t+1}, g_{t+1}\right)\right]\right.\right.
$$

$$+ (1-\mu_{t\bar{+}1})\cdot\beta\cdot E\left[\delta c_{t+1}\right]\right], z(a_t,c_t),(1-d_t)\cdot c_t)\Big] \tag{D.4}$$

subject to

$$\begin{aligned} E\left[\delta c_{t+1}\right] &= E\left[\delta \max\left[\left(1+r_{t+1}\left(i_t\right)-v_t^c\right)\tilde{c}_t, 0\right]\right] \\ \tilde{c}_t &= c_t - \left(w_t g_t + v_t^b\right) b_t - f_t \cdot 1[c_t < \bar{f}] \\ b_t &= \min\left[\max\left[\left(1+e_t\right) b_t, \tilde{c}_t\right], \bar{b}\right] \\ g_{\bar{t}} &= \begin{cases} g_{A(a_t)} \text{ if } b_t = \tilde{c}_t \text{ or } a^{first} = a_t \\ g_{t-1} \text{ otherwise.} \end{cases} \end{aligned}$$

Since we work in $\frac{CV}{IB}$ space, we must show that the obtained values are equivalent. Note that

$$V_t(CV_t, IB_t, Y, g) = \max_{w,i} g\cdot IB_t\cdot w + E[\delta V_{t+1}(CV_{t+1}, IB_{t+1}, Y, g)]. \tag{D.5}$$

Expanding the second term, we have

$$\begin{aligned} IB_t\cdot E\Bigg\{\delta\cdot\Bigg[1\left[\frac{CV_t}{IB_t}(1-v^c)-(g\cdot w+v^b)R \geq e_t\right]\left(\frac{CV_t}{IB_t}(1-v^c)-v^b-g\cdot w\right) \\ \cdot V_{t+1}(1,1,\bar{Y},g_{t+1})\Bigg] + \Bigg[1\left[\frac{CV_t}{IB_t}(1-v^c)-(g\cdot w+v^b)R < e_t\right] e_t \\ \cdot V_{t+1}\left(\frac{CV_t}{IB_t}(1-v^c)-(g\cdot w+v^b)\frac{R}{e_t}, 1, \bar{Y}, g_{t+1}\right)\Bigg]\Bigg\}, \end{aligned} \tag{D.6}$$

where $\bar{Y} \equiv \min[E, \bar{t}-t-1]$. Grouping (D.5) and (D.6), we see that the net expression is

$$IB_t\cdot V\left(\frac{CV_t}{IB_t}, 1, Y, g\right).$$

Backward induction until the initial period yields the value of the contract, $\hat{V}_0^*\left(c_0, c_0, E, g_0\right)$. Note that as the periods decrease the set of possible GAI rates decreases, as one need not solve for the value function at age 70 for GAI rates that are only available if the first withdrawal is at age 75. Moreover, the problem is initialized with 0 years since the last step up, and the annuitant is guaranteed E

enhancement years, so one need not solve for the value function for infeasible values of years since last step up during the first E years of the contract. Finally, some asset allocation alternatives for fixed indexed annuities lock in funds for more than one period. When that happens, we value that alternative using the continuation value for the appropriate horizon, rather than the continuation value for the next period.

D.3. Solving for the Value of a Variable Annuity and Fixed Indexed Annuity Contracts without a Living Benefit Rider

The problem is significantly simpler in this case, as there is no income base, no enhancement, and no step up. The problem in period $T-1$ is

$$
\begin{aligned}
& V_{T-1}\left(c_{T-1}\right)=\max\left[\beta \cdot E[\delta c_T], z(a_{T-1}, c_{T-1}), (1-d_{T-1}) \cdot c_{T-1})\right] \\
\text{subject to} \quad & E\left[\delta c_T\right]=E\left[\delta \max\left[\left(1+r_T\left(i_{T-1}\right)-v_T^c\right) \tilde{c}_{T-1}, 0\right]\right] \\
& \tilde{c}_{T-1}=c_{T-1}-f_{T-1} \cdot 1[c_{T-1}<\bar{f}].
\end{aligned}
$$

Discretizing the space of contract value allows us to solve for the optimal asset allocation if the contract is continued, and comparing this value to that of annuitization or full withdrawal yields the optimal strategy in this period for a grid of contract values. Interpolation yields $\hat{V}^*_{T-1}\left(c_{T-1}\right)$, the value of following the optimal strategy in period $T-1$ if landing on that period with contract value c_{T-1}. In this setting, the only difference between a variable annuity contract and a fixed indexed annuity contract will come from the menu of investment strategies available and the value of the fees.

The recursive formulation for previous periods is

$$
\begin{aligned}
V_t\left(c_t\right)=\max\Big[&\mu_{t+1} \cdot E[\delta \hat{V}^*_{t+1}\left(c_{t+1}\right)]+\left(1-\mu_{t+1}\right) \cdot \beta \cdot E[\delta c_{t+1}]\ , \\
& z(a_t, c_t), (1-d_t) \cdot c_t]
\end{aligned}
$$

$$
\begin{aligned}
\text{s.t. } & E\left[\delta c_{t+1}\right]=E\left[\delta \max\left[\left(1+r_{t+1}\left(i_t\right)-v_t^c\right) \tilde{c}_t, 0\right]\right] \\
& \tilde{c}_t=c_t-f_t \cdot 1[c_t<\bar{f}].
\end{aligned}
$$

Solving this problem by backward induction yields the value of the contract, $\hat{V}_0^*(c_0)$.

D.4. Forward Simulations

In Table 5, we report results of the effect of extending fiduciary duty to BDs on the 10th percentile of the distribution of returns of the products they sell. This requires moving beyond the mean return of each asset, the object of interest in the previous subsections, and obtaining instead the distribution of returns.

To do so, we save the optimal policies from the aforementioned problems, and draw 100 paths of returns from the time of purchase to the maturity date of the contract. The optimal policies give us the set of actions an individual would take for a grid of realizations of contract value and income base (if pertinent) for every age between contract purchase and maturity. For each draw of the path of returns, we start at contract purchase, execute the optimal action, observe the transition to the next period, and execute the optimal action again. We repeat this process until maturity. Since we only have optimal policies for a grid of contract value and income base, we interpolate them whenever necessary.

This process yields the contract value and income base available to the client at maturity for each draw of returns paths. We calculate the NPV of the optimal action at this stage, retirement or withdrawal, and add to this the NPV of any flows received prior to maturity. For example, the NPV of all GAI withdrawals taken prior to that age. For each draw, this yields the value of the contract at maturity, which we then transform to a return. The vector of return draws is our approximation to the return distribution.

E. Dataset Details (For Online Publication)

The analysis relies on seven sources of data: Transactions, Discovery, Beacon Annuity Nexus, Morningstar, CRSP, VA prospectuses, and FIA rate sheets. Below, we describe the data in detail, including the collection process and methods used to map across sources. We also discuss the sample selection criteria.

E.1. Data Sources

Transactions. The Transaction dataset contains information on each of FSP's transactions of annuity, deferred-contribution, and insurance products sold between January 1, 2008 and February, 2016. We restrict attention to deferred annuity (variable and fixed indexed) contracts initiated between 2013 and 2015. The unit of observation is an individual payment, including lump sum and periodic payments, but we aggregate to the contract level. In our final dataset, each observation is a unique contract, and we observe the contract amount at purchase, age of the contract holder, adviser(s) associated with the sale, as well as information on the financial product, importantly the product type and share class, and codes indicating any supplemental rider purchases.

Discovery. The Discovery dataset serves two purposes. First, we rely on it to augment the Transaction dataset with detailed information about advisers. The Discovery dataset contains information on advisers and the firms with which they were employed on December 31, 2015. We observe adviser characteristics, such as an indicator of whether the adviser is a BD or DR, the adviser's age, gender, and the location of the branch office. We use this branch location to define the adviser's fiduciary standard. Additionally, the Discovery dataset provides unique identifiers of the adviser's BD firm and RIA firm (if applicable) and includes characteristics such as firm footprint, number of employees, and primary business line. We map information from the Discovery dataset to the Transaction dataset using a unique adviser ID provided by FSP and restrict to advisers and firms available in Discovery. We cannot use this adviser ID to map externally, however.

We also leverage the Discovery dataset for the market structure analysis. We observe the universe of registered financial advisers who are able to sell annuities as of December 31, 2015. For our main specifications, the outcomes of interest are the aggregate number of advisers and associated firm branches at the county level. We also explore heterogeneity by firm footprint. Discovery defines the firm footprints as follows:

- Local: located in no more than a few offices in one state or close proximity

- Multistate: located in multiple states but not large or concentrated enough to be categorized as a regional firm
- Regional: substantial office and adviser coverage across a region, e.g., the Midwest
- National: substantial office and adviser coverage across the U.S.

Beacon Research. For detailed product information, we rely on Beacon Research's Annuity Nexus. This dataset provides historical information on annuity fees and characteristics, as well as changes in availability and characteristics of supplemental riders.

We manually map product names and share classes from Beacon to the detailed descriptions provided in the Transaction dataset. This mapping is straightforward because a high level of detail is provided in the Transaction dataset. The mapping of rider selections is more difficult. The Transaction dataset provides a unique code for each rider selection but does not include a description. Instead, we rely on temporal restrictions on rider availability to match the codes with Beacon. The process is as follows:

- *Rider Availability Restrictions*: Create a crosswalk that lists each rider code combination and any potential corresponding rider name in Beacon. In this step, we rely on rider availability restrictions. Specifically, if a rider is not available for a given product, then it is eliminated as a potential mapping for all rider code combinations associated with that product in the Transaction dataset. Note that, after implementing the availability restrictions, there are certain combinations of rider codes that could only correspond to a single Beacon name, while others could correspond to more than one.
- *Temporal Restrictions*: For the rider code combinations that may correspond to more than one Beacon name, we implement temporal restrictions in an attempt to obtain a unique mapping. We compare the first and last transaction dates (from the Transaction dataset) for a given product and set of rider codes with the Beacon introduction and closing dates. We eliminate a rider as a potential

Beacon mapping if the first transaction date is before the introduction date or if the last transaction date is after the closing date. Note again that temporal restrictions are only used if there are multiple potential Beacon mappings.

After implementing the above restrictions, we obtain unique rider mappings for approximately 68% of contracts issued between 2008 and 2016.

Morningstar. Morningstar provides data on the subaccounts underlying annuity products, and we use a number of measures contained in Morningstar's data, including subaccount fees, investment styles, and the number of "high quality" funds, as measures of investment quality. We manually map annuity product names from Morningstar to the product descriptions provided in the Transaction dataset.

CRSP. CRSP provides returns net of expense ratios for each subaccount. We manually match fund names in the CRSP database with those provided in VA prospectuses (described in Section VI below). The fund names do change over time for the same fund, so we use CRSP's permanent fund number to aggregate historical returns for the fund. Finally, we use historical Fama-French factors from CRSP.

VA Prospectuses. For the NPV calculations, we rely on data obtained from VA prospectuses stored in the SEC's EDGAR database. We manually collect information on investment restrictions that contract holders must follow when they elect supplemental riders. Additionally, we obtain the number of accumulation units in the subaccounts for each product, which measure aggregate investment choices. We map this information to the transaction dataset using the Beacon product names and riders obtained through the process described in Appendix E.1.

FIA Rate Sheets. Historical data on formulas and rates from crediting strategies available in each FIA product come from *rate sheets*, which are issued monthly by FSP and distributed to advisers. While these rate sheets, unlike VA prospectuses, are not consistently filed in any publicly available database, we collect them through two means. First, some advisory firms have posted historical rate sheets for FIAs online, and we develop a large archive of such sheets through extensive web searches.

Second, some states require FSP to file rate changes to FIA products with the state insurance agency. Through a series of Open Records Requests with the Texas Department of Insurance and the Florida Office of Insurance Regulation, we have collected further rate sheets to complete the historical database and corroborate the sheets obtained from advisory firms. As expected, since rates and crediting strategies do not depend on the state or the adviser who sells the product, rate sheets for the same month obtained through two different sources always agree.

E.2. Sample Selection

Note that the transactions dataset contains all transactions from 2008–15, and Discovery contains licensing information in 2015. To arrive at the final sample for analysis, we make a number of restrictions. First, we restrict to contracts sold in 2013–15 so that licensing and regulatory information is likely to be correct; this takes us to 248,103 transactions (from 689,454 annuity in the full dataset). Second, we keep transactions in which geography, (masked) adviser identity, and adviser type are all identified (234,135 observations after the restriction). These restrictions ensure that we know the fiduciary standard of the adviser who sells the product, if we can map to Discovery. Third, we drop all contracts sold in New York; there is substantially different financial regulation in that state—to the point where advisers in New York carry a different line of FSP products than those in other states. Indeed, most financial services providers sell a different suite of products in New York through advisers. We have 221,547 contracts after the restriction. Fourth, we restrict to firms and advisers with a record in Discovery, which takes us to 215,967 contracts. Fifth, we restrict to deferred annuities (variable and fixed indexed); we only drop about 1% of contracts (2,392) with this restriction, consistent with the fact that immediate annuities are especially rare in the United States. Finally, we restrict to contracts sold to individuals age 85 and younger, as variable annuities are not available to individuals over age 85; this drops 1,055 contracts.

After these restrictions, the main sample contains 22,472 contracts sold in border counties, 19,730 of which are VAs. Nationwide, the sample consists of 212,520 contracts, 188,542 of which are VAs.