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FIDUCIARY DUTY AND THE MARKET FOR FINANCIAL ADVICE

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ABSTRACT

Recent regulatory debate in the financial advice industry has focused on expanding fiduciary duties to broker-dealers. Proponents of this reform argue that it would improve the advice given to clients and limit losses from agency problems, while detractors counter that such regulation would increase compliance costs without directly improving consumer outcomes. This paper evaluates these claims empirically, using a transactions-level dataset for annuity sales from a major financial services provider and exploiting state-level variation in common law fiduciary duty. We find that imposing fiduciary duty on broker-dealers shifts the set of products they sell to consumers, away from variable annuities and towards fixed indexed annuities. Within variable annuities, fiduciary duty induces a shift towards lower-fee, higher-return annuities with a wider array of investment options. We develop a model that leverages the distributional changes in products sold to test the mechanism by which fiduciary duty operates. We find evidence that fiduciary duty does not solely increase the cost of doing business but that it has the intended effect of directly impacting financial advice.

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I. Introduction

Many individuals in the United States buy complex financial products to save for retirement, and they use financial advisers to help them find, evaluate, and choose between these products. As in any industry where experts provide advice to less-informed customers, a natural concern is whether incentives are aligned. This concern is exacerbated in the financial advice industry, as many advisers are compensated on commission, receiving higher payouts from steering clients towards high fee products. Regulators—such as the Securities and Exchange Commission, state regulatory authorities and courts, and the Department of Labor—have recognized this potential conflict of interest and imposed various “standards of care” to alleviate it. The most stringent standard of care is that of fiduciary duty, which roughly requires advisers to act in the best interest of their consumers.¹ Currently, financial advisors 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. In recent years, regulators have discussed expanding fiduciary duty to include all financial advisers, including broker-dealers and registered investment advisers.² Supporters of the expansion argue that imposing fiduciary duty on all advisers will alleviate conflicts 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—because competition already disciplines financial advisers, because the conflict-of-interest was overblown to begin with, or because fiduciary duty does not actually constrain advisers at all—but will instead increase the cost of doing business, leading to fewer advisers in the market and fewer retirees purchasing beneficial products.

This paper evaluates these competing claims empirically. First, we estimate the causal effect of fiduciary duty and test for the presence of a constraint on advice using a new dataset of transaction-level data for annuity sales from an anonymous financial services provider (“FSP”). FSP is a large company—within the top-five companies by market share in the market for annuities—that is representative of other large companies in this industry in terms of types of products offered, size of

¹Section II.A discusses in greater detail what comprises fiduciary duty in various settings.

²In 2016, the Department of Labor promulgated rules expanding fiduciary duty to broker-dealers handling retirement savings. After several delays during the Trump administration, the Fifth Circuit struck down the rule as overreaching the DoL’s administrative powers (see *Chamber of Commerce of the USA v. United States Department of Labor*, No. 17-10238 (5th Cir. 2018)). Several state treasurers have since signed an appeal to the SEC, asking for federal action expanding fiduciary duty to broker-dealers. See <https://www.marketwatch.com/story/is-the-fiduciary-rule-dead-or-alive-what-its-fate-means-to-you-2018-03-16>.

the adviser network, and financial health. This dataset contains information about every contract sold by FSP from 2008–2015, detailed data about the product and adviser and some limited data on the client. Crucially, for each transaction we observe the type of adviser (RIA vs. BD) and granular geographic information about the locations of the transacting parties.

Although **broker-dealers do not have fiduciary duty at the national level, state courts in several states have ruled that they are fiduciaries to their customers.** In this paper, we will argue that fiduciary duty has a causal impact on outcomes by leveraging comparisons between broker-dealers and registered investment advisers across state borders where fiduciary status for broker-dealers differs. To do so, we will focus on two related estimators that will deliver the causal impact of fiduciary duty under different assumptions: a differences-in-differences estimator (across counties on different sides of a state border and across adviser types), and the difference within advisor type across the border. The differences-in-differences estimator will be robust to demand changes at the borders, provided they are constant across adviser types, but will not be robust to spillover effects of regulation onto RIAs. Interpreting the within-adviser type difference causally requires the assumption of no systematic demand differences at the border, but under this assumption it delivers an estimate of the causal effect of the regulation onto broker-dealers and of the spillover effect onto RIAs. As a result, this estimator is robust to the presence of spillover effects onto RIAs. Strikingly, we find that across a wide variety of outcome variables, the difference across the border for registered investment advisers is zero, which has two important implications. First, for this to hold in the presence of a demand break across the border, one would need a spillover effect onto RIAs that perfectly counteracts the demand break, which we believe to be implausible. This, together with a battery of other checks, lends credence to the identifying assumptions embedded in the border difference. Second, since the difference for RIAs is often insignificant, implies that the estimates of fiduciary duty on broker-dealers from the two strategies largely agree in magnitude.

Using these strategies, we find that extending fiduciary duty to broker-dealers leads to a compositional shift in the set of products purchased by their clients. **More specifically, broker-dealers sell fewer variable annuities relative to fixed indexed annuities under fiduciary duty.**³ The effect of fiduciary duty on variable annuity sales is substantial: **about three-fourths of all annuities sold by a typical broker-dealer are variable annuities, and imposing fiduciary duty on broker-dealers**

³The structure of annuity products is discussed in greater detail in Section II.B.

reduces this proportion by around 9 percentage points. This is not the case for registered investment advisers, whose sale composition does not change. Unfortunately, it is difficult to make welfare statements about this shift, as fixed indexed annuities do not dominate variable annuities (or vice-versa). However, variable annuities have been under significant scrutiny by regulators, given their poor reputation as high fee, low yield products.⁴

We also study the effect of fiduciary duty on the product characteristics of transacted variable annuities. By focusing on a single product type and on characteristics that have a straightforward welfare interpretation, such as fees, we are able to make clearer statements about advice quality. Annuity products have complex and multidimensional fee structures, and we find that extending fiduciary duty to broker-dealers causes their clients to purchase products with lower fees on many of these dimensions. Moreover, under fiduciary duty broker-dealers steer customers towards products with a larger and more diverse set of investment options that, under several alternative assumptions on the portfolio allocation, lead to improved mean returns. We then aggregate all these dimensions by formulating and solving a dynamic programming problem to compute the net present value of all variable annuities in the dataset, assuming optimal execution by a risk-neutral individual. We find that broker-dealers with fiduciary duty sell their clients higher-return variable annuities. Along all of the aforementioned specifications, we find no evidence that of spillover effects of regulation onto registered investment advisers.

These results tell us that fiduciary duty has an impact on consumers, but they cannot tell us the mechanism underlying this effect. To disentangle the mechanism, we develop a model of entry into the provision of financial advice with heterogenous adviser qualities and differentially regulated firms that encompasses the arguments of both detractors and proponents of extending fiduciary duty to all broker-dealers. Detractors argue that this reform will only increase the cost of doing business, regardless of advice quality. If this argument, which we call the *fixed cost channel*, is true, then fiduciary duty will lead to exit of broker-dealers, and potentially to entry of registered investment advisers. However, proponents argue that it will constrain advisers from providing low quality advice. We name this argument 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.

⁴See, for example, <https://www.thinkadvisor.com/2014/07/28/variable-annuities-a-top-source-of-customer-compla/?slreturn=20181123212558> or <https://www.finra.org/sites/default/files/InvestorDocument/p125846.pdf>.

Moreover, their exit may induce the entry of previously unprofitable advisers offering high quality advice. The distinguishing feature between these two mechanisms is that there cannot be entry of broker-dealers offering high quality advice if fiduciary duty operates solely through the fixed cost channel.

Distinguishing between these two channels has important implications for policy, as the advice channel implies that fiduciary duty constrains advisers' ability to provide low-quality advice, while the fixed cost channel implies that fixed cost increases happen to lead to an equilibrium with on average fewer low quality advisers. Moreover, we argue that if fiduciary duty were to operate solely through the latter channel, then the mean impact is less likely to be externally valid or to be robust to different levels of stringency in the fiduciary standard.

To study the impact of fiduciary duty on market structure, we leverage an additional dataset provided by FSP with information about all advisers who can sell annuities in the United States, including those who have not transacted with the company. We find that imposing fiduciary duty on broker-dealers reduces the number of broker-dealer firms operating in the market by about 16%. Moreover, we document a compositional shift to not just investment advisory firms—whose number are not significantly affected by the regulation—but also to broker-dealer firms with larger footprints.

We then use the predictions of the model to test whether any of the shift in equilibrium purchases is plausibly driven by a change in advice. As our model predicts, product quality may increase directly through the advice channel or indirectly through the fixed cost channel if exiting firms offer more distorted advice. By leveraging the distribution of advice—proxied in the data by the net present value of the annuity—rather than simply its mean, we find evidence that is consistent with the advice channel, and we are able to determine that regulations that increase the fixed cost of operating as a financial adviser would have the unintended consequence of driving the firms that provide the highest-quality advice out of business. Fiduciary duty works, at least in part, as intended—by directly impacting financial advisers' advice to their clients.

There are several important limitations to our analysis. To begin, our estimates are specific to variation in fiduciary duty induced by common law. State legislation or national rulemaking by the DOL or SEC may induce a number of other effects. If the sole difference between common law and these other efforts is the stringency of enforcement, the presence of the advice channel provides

suggestive evidence that rules may continue to impact product selection in the same way. However, state legislation or national rulemaking may also lead to product reformulation, an issue that we are not able to address. Another limitation is that we are not able to make statements on social welfare. There are two main reasons for this. First, one may believe that differentiation in this industry is not large enough to counteract the inefficiency from free entry (Mankiw and Whinston, 1986), and as a result exit of firms can be welfare enhancing. Since we do not have structural estimates of profits or fixed costs, we cannot speak to this effect. Moreover, as Agarwal, Chomsisengphet, Mahoney, and Stroebel (2014) discuss, distorted advice can lead to excessive private demand for products, relative to the social demand function. In such a setting, exit of firms can also increase welfare if it leads to additional exertion of market power and higher prices. Despite these limitations, we believe that by providing evidence that fiduciary duty has an effect on consumer choice, that this effect leads consumers to purchase products with higher returns and a wider array of investment options, and that these findings must have come, at least partially, from a change in advice, this paper provides an important contribution into this policy debate.

Related Literature. Despite the importance for public policy of studying the impact of fiduciary duty, there has been limited empirical work on this topic—possibly in part because of a lack of useful data. We are aware of a small number of papers that study questions similar to ours. Finke and Langdon (2012) classify states based on whether they place common-law fiduciary duty on broker-dealers and find that fiduciary duty does not impact the number of broker-dealers per household. They also run surveys with financial advisers to ask whether fiduciary duty standards constrain the advice they give to clients. Their estimates on both dimensions are noisy, and they suffer from the important drawback that comparisons are conducted *across entire states*. Our border strategy at least partially addresses the issues that states with fiduciary duty may be different in other dimensions. Kozora (2013) considers a temporary change in the fiduciary standard of a subset of brokers in the municipal bond market and finds that more strict standards led to more recommendations of investment-grade bonds. Finally, Egan (2017) considers the impact of fiduciary duty in the reverse convertible bond market, documenting significant dispersion in the market value of these bonds and high likelihoods of purchase of dominated products. Through the lens of a search model, he estimates that extending fiduciary duty to all financial advisers would increase

consumers' risk-adjusted returns by 2%. We are also aware of concurrent work-in-progress by Labro and Omartian (2017) of fiduciary duty on compliance activities.⁵

This paper is related to a broader literature on the market for financial advice. While theoretical work on financial advice has a long tradition,⁶ there is a growing body of recent empirical work on this market. Recent work has studied the prevalence and geographic concentration of misconduct in this industry (Egan, Matvos, and Seru, 2019); we should be clear that nothing in our dataset is evidence of misconduct, but our paper does highlight geographic concentration of certain types of advice and choice behavior induced by regulation. 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. A number of papers have documented intermediaries responding to commissions and other incentives rather than offering clients appropriate advice,⁷ although none of these papers study how proposed regulation might influence these outcomes. On the other hand, Linnainmaa, Melzer, and Previtro (2016) show that advisers' personal portfolios look like their clients', suggesting that suboptimal advice may be due to misconceptions about products rather than commissions.⁸ Our results suggest that equilibrium product choice likely depends on something other than advisor beliefs: financial regulation does have a substantial impact.

This work adds three main contributions to this literature. First, it provides estimates of the causal effects of extending fiduciary duty to broker-dealers on the equilibrium set of products sold by both broker-dealers and registered investment advisers, and on various metrics of product quality. Second, it shows that while these average causal effects are interesting for the analysis of this specific fiduciary duty policy, they are not informative of the channel through which fiduciary duty operates. Moreover, the implications for external validity of the aforementioned causal effects are starkly

⁵To our knowledge, Labro and Omartian (2017) use a different cut of our dataset but focus on changes induced by the FINRA Know-Your-Customer Rule.

⁶See Inderst and Ottaviani (2012a). Inderst and Ottaviani (2012b) provides a good summary of the literature.

⁷See, for instance, Anagol, Cole, and Sankar (2017) in the context of life insurance in India, Mullainathan, Noeth, and Schoar (2012) for financial advisers in the United States (although without any discussion of fiduciary standards), Dickstein (2015) in the context of medicine, Guiso, Pozzi, Tsoy, Gambacorta, and Mistrulli (2017) for mortgages in Italy, Hong (2017) and Barwick, Pathak, and Wong (2017) for real estate, and Camara and Dupuis (2014) and DellaVigna and Hermle (2017) for movie reviews.

⁸Using a related dataset, Foerster, Linnainmaa, Melzer, and Previtro (2017) show that advisers tend to give similar advice to all their clients, which is also consistent with misguided beliefs.

different across channels. Third, it shows sufficient conditions for fiduciary duty to operate as a constraint on advice, and documents empirical evidence for this channel. This final result lends credence to the position that extending fiduciary duty to broker-dealers at the federal level would be beneficial to consumers by continuing to impact advice along the dimensions observed in this paper.

The rest of the paper proceeds as follows. Section II discusses institutional details: the market for financial advisers, fiduciary standards, and properties of annuities. Section III describes the data. Section IV discusses the effect of fiduciary duty on product choice. Section V presents the model of fiduciary duty that will guide the remainder of the analysis. Section VI discusses the effect of fiduciary duty on market structure. Section VII uses the model to disentangle whether fiduciary duty operates through the entry channel or the advice channel, and Section VIII concludes.

II. Institutional Details

In this section, we introduce the relevant details of the institutional setting. Section II.A discusses the role and types of financial advisers in the US and how fiduciary standards governing their behavior have evolved. Section II.B then discusses details of variable, fixed, and fixed indexed annuities, which are the specific 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. The first type, registered investment advisers (RIAs), are regulated at the federal level by the SEC under the Investment Advisers Act of 1940. The second, 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. Registered investment advisers must be affiliated with a brokerage firm in order 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 will be either broker-dealers or dual registrants—as they are selling annuities—but we will 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 originally issued by upstream financial services providers. Given their history of brokering transactions, BDs tend to be paid by commission, receiving a fraction of the fee associated with a product. Compensation schemes for RIAs, on the other hand, tend to be a combination of commissions and “fees”, which are a percentage of assets under management. Following the literature, we refer to RIAs who accept both commissions and fees as “fee-based”, and to RIAs who only accept fees as “fee-only.” Advisers who are compensated, even in part, on the basis of commissions have a conflict of interest: they have an incentive to recommend higher fee products that benefit themselves over lower fee products that benefit their customers.

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” for the consumer, 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.⁹ 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 place the interest of the customer over the RIA’s own interest. Fee-only advisers have no incentive to violate this duty, but fee-based advisers that take commissions also face a requirement of transparency towards the consumer, such as disclosure of compensation arrangements. RIAs must obtain the best price for each contract, and 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. 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.¹⁰

⁹See <http://www.finra.org/industry/suitability>.

¹⁰Arbitrability varies across claims and states, although, to our knowledge, not across adviser types. Some, but not all, states will allow tort claims to be brought that are very similar in nature to arbitrable claims even when there

Consumer groups and the SEC have long been troubled by the arbitrary difference in regulatory standards across BDs and RIAs. Studies by the SEC (SEC, 2011, 2013a,b) have suggested 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 across BDs and RIAs, 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.¹¹ **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 that customer.** 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.¹² However, a number of decisions by the Trump administration along with legal rulings make it unlikely, at the time of this draft, that the rule will go into effect.¹³

This project takes advantage of variations in state common law that have already imposed fiduciary obligations on financial advisers in certain states, in order to estimate the impact of imposing fiduciary duties on BDs. Some states have imposed a common law duty of care that rises to the level of a fiduciary duty, or imposes 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 I plots this classification.¹⁴ These duties

are mandatory arbitration clauses in the contract between client and adviser.

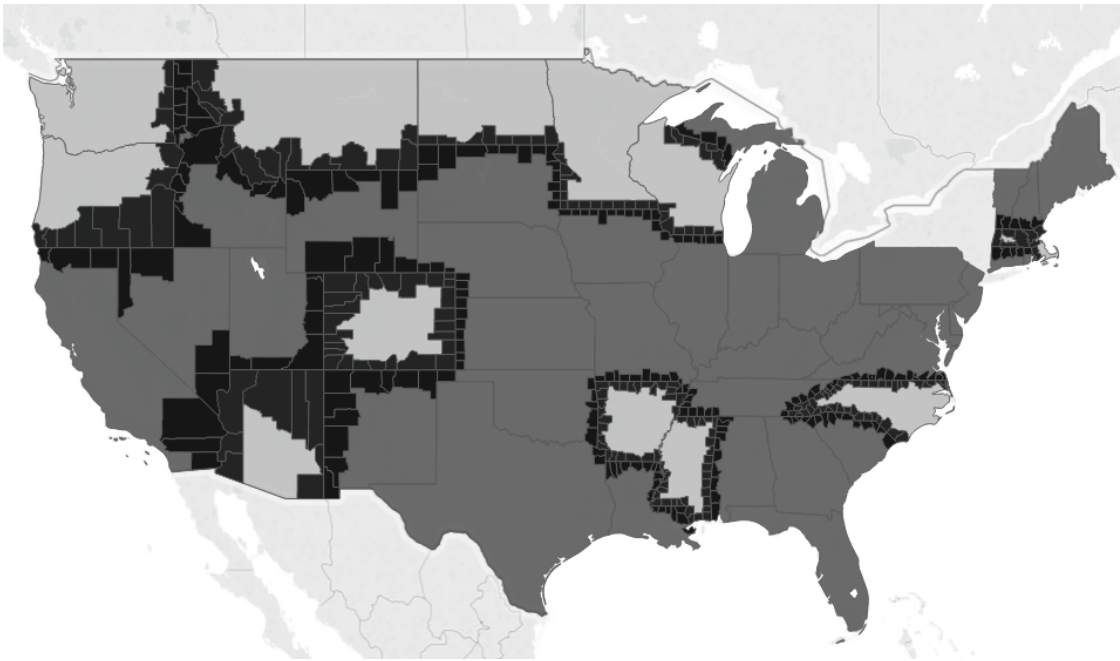
¹¹See <https://www.dol.gov/agencies/ebsa/laws-and-regulations/rules-and-regulations/completed-rulemaking/1210-AB32-2>.

¹²See <http://www.investmentnews.com/article/20170810/FREE/170819991/dol-fiduciary-rule-compliance-costs-exceed-4-7-billion-sifma-study>.

¹³As of March 2018, the Fifth Circuit Court of Appeals vacated the DOL Rule, 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. The SEC is additionally proposing its own version of the regulation, as are states through *legislation*, rather than common law.

¹⁴In our analysis, we follow Finke and Langdon (2012) and say the following states have fiduciary-like duty: Alabama, California, Connecticut, Georgia, Idaho, Illinois, Iowa, Kansas, Louisiana, Michigan, Missouri, Nebraska, Nevada, New Hampshire, New Mexico, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Wyoming. The control states, with no heightened duty, are: Arizona, Arkansas, Colorado, Massachusetts, Minnesota, Mississippi, Montana, North Carolina, North Dakota, Oregon, Washington, Wisconsin.

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



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

allow clients to sue their financial advisers for low quality advice.¹⁵ Since all RIAs already comply with 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). It is important to note that states may not always be able to enforce these duties and that **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.**¹⁶ Nevertheless, BDs operating under the shadow of potential state law liability may make modifications to their behavior and compliance programs to minimize potential costs, resulting in changes to their recommendations, consumer purchasing behavior, market structure and sales by competitors, and other equilibrium

¹⁵Advisers 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/secnasdvp.htm>).

¹⁶Most state law fiduciary duty claims are brought by private individual litigants, while statutory fiduciary duty claims could allow for more state enforcement actions and class actions

effects.

II.B. Fixed and Variable Annuities

To study the effect of fiduciary duty on the set of chosen investment products, we focus on annuities, which are 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 fiduciary duty rule.¹⁷ The simplest annuity contract is a fixed immediate annuity (or “income annuity”), in which investors turn over a lump sum amount in exchange for a promise to receive a fixed periodic payment until death. These products constitute a very small fraction of the US annuity market. Instead, most annuity contracts sold in the US are deferred annuities. 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 and variable annuities 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 on to the contract.

Investors in fixed indexed annuities distribute their funds during the accumulation phase between a “fixed account,” which offers a guaranteed interest rate for a predetermined period of time,¹⁸ and a set of “indexed accounts,” where returns are tied to the performance of an underlying index, usually the S&P 500.¹⁹ In most cases, fees are not directly charged as part of the vehicle, but the margin comes from the gap between the realized return of the underlying index and the accrued return. The main exception to this statement are “surrender charges,” which tax withdrawals taken

¹⁷ “The quantified losses also omit losses that adviser conflicts produce in connection with IRA investments other than mutual funds. Many other products, including various annuity products, among others, involve similar or larger adviser conflicts, and these conflicts are often equally or more opaque. Many of these same products exhibit similar or greater degrees of complexity, magnifying both investors’ need for good advice and their vulnerability to biased advice,” from <https://www.federalregister.gov/documents/2016/04/08/2016-07924/definition-of-the-term-fiduciary-conflict-of-interest-rule-retirement-investment-advice>.

¹⁸ Products differ dramatically in the length of the guaranteed interest rate period, from 1 year to 8. Regardless of length, after this period ends the fixed account has a guaranteed interest rate that varies yearly.

¹⁹ There are three prototypical mappings from the returns of the index to the returns of the account: “point-to-point,” “monthly-average,” and “performance triggered.” Under “point-to-point” crediting, the return of the account is the return of the underlying index between two predetermined points in time, with a cap and a floor. Under “monthly-average” crediting, each year the account is credited the average monthly return of the index. Finally, under “performance triggered” crediting, the indexed account receives a predetermined rate of return (usually between 4% and 6%) if the index has positive returns, and 0 otherwise.

in the first years of the accumulation period if they exceed a free withdrawal amount (typically 10% of contract value). Fixed indexed annuities are typically converted into a fixed annuity once investors are sufficiently old, transitioning the contract into the payout phase. In the case of death during the accumulation period, beneficiaries receive the contract amount.

Variable annuities replace the relatively small set of indexed accounts in fixed indexed annuities with a pool of investment funds, with a wide range of asset allocations, risk profiles, and fees. The most basic variable annuity contract resembles a fixed indexed annuity, with contract values accruing interest according to the performance of the set of funds chosen, and investors receiving 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 surrender charges if withdrawing money in the first years of the accumulation period. Often, variable annuity contracts are sold with *living benefit riders*. These riders provide a degree of guaranteed income, at some fee. However, their structure can also incentivize excessive risk-taking in fund selection.²⁰ To partially mitigate these incentives, riders usually impose restrictions on the investment portfolio an annuitant can choose.²¹ Furthermore, the incentive to annuitize a variable annuity is usually low, since it involves surrendering rider benefits.

Optimal execution of variable annuity 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 price than a fixed indexed annuity. However, if executed correctly and with favorable returns, these contracts have significant upside potential. Thus, no product strictly dominates the other, and certain types of consumers will be better served by purchasing a variable annuity while others will benefit more from a fixed indexed product.

²⁰As an example, the most common rider in our dataset is a “minimum withdrawal.” With this rider, a fictitious account called an “income base” grows yearly by an enhancement rate, but it can increase to the contract amount if the contract amount exceeds this income base. At some age (usually 55), the annuitant can take a yearly payout from the income base. Since the income base benefits from the upside returns of the contract but is partially shielded from the downside risk, there is an incentive to both delay withdrawal (so that the contract base may benefit from positive shocks) and to invest in risky funds.

²¹See Koijen and Yogo (2018) for a study of how these incentives feed into financial fragility of life insurance companies.

III. Data

In Section III.A, we describe the data provided to us by the financial service provider about their 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, which we will refer to as FSP throughout the paper. While our data use agreement prevents us from being able to disclose the identity of this company, it is representative of major companies in the financial services industry, and is within the top-five companies by market share in the market for annuities. FSP sells a mix of annuities and insurance products in all fifty states, has household name recognition, is publicly traded, and has fairly large market capitalization. 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 of the transaction, the advisor selling the product, and the dollar amount of the transaction. If a contract involves multiple transactions—such as recurring payments—then these multiple transactions can be grouped together. In these situations, the contract amount we report is the sum of the transaction amounts for all transactions linked to that contract. 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 a fairly rare event, and we ignore these correlations in this analysis.

We have considerably more information about advisers in the dataset: while they cannot be identified in a way that makes it possible to match them to external datasets, they can be linked across transactions in the dataset. Moreover, FSP has also provided us data from Discovery Data, an industry data vendor, for advisers in 2015 who could potentially sell annuities or life insurance.²² This dataset allows us to observe personal variables about the adviser, such as basic demographics, as well as regulatory information such as licensing and whether the adviser is registered as a broker-dealer representative (BD), a registered independent adviser (RIA), or both (DR). With some

²²While not all advisers in the transaction data from FSP can be matched to Discovery, the overwhelming majority can. Moreover, the advisers who remain unmatched look very similar in terms of their transactions to those who are matched, which allays concerns about the imperfect match.

Table I: Summary statistics for border counties

| | N | Mean | Std.Dev. | Percentiles | | | | |
|----------------------------------|--------|-------|----------|-------------|------|-------|-------|-------|
| | | | | 10% | 25% | 50% | 75% | 90% |
| <i>Advisor-Level Quantities</i> | | | | | | | | |
| Is Broker-Dealer | | | | | | | | |
| FSP Advisors | 4,016 | 0.205 | | | | | | |
| Contracts per FSP Advisor | | | | | | | | |
| BD | 822 | 5.7 | 9.2 | 1 | 1 | 2 | 6 | 14 |
| RIA | 3,194 | 5.7 | 9 | 1 | 1 | 3 | 6 | 14 |
| <i>Contract-Level Quantities</i> | | | | | | | | |
| Is Variable Annuity | | | | | | | | |
| BD | 4,706 | 0.789 | | | | | | |
| RIA | 18,097 | 0.889 | | | | | | |
| Contract Amounts (\$K, 2015) | | | | | | | | |
| BD | 4,706 | 119.8 | 140.9 | 24.2 | 42.8 | 80.1 | 148.8 | 251.5 |
| RIA | 18,097 | 152.9 | 179.3 | 34.2 | 54.5 | 100.9 | 188 | 304.1 |
| Client Age | | | | | | | | |
| BD | 4,706 | 61.4 | 10.4 | 49 | 55 | 62 | 68 | 74 |
| RIA | 18,097 | 64.7 | 9.6 | 54 | 59 | 65 | 71 | 77 |

exceptions, advisers in this cut of Discovery Data are all broker-dealers or dually-registered advisers, and those who transact with FSP are *all* either BDs or DRs.²³ We will refer to these groups as BDs and RIAs throughout the paper. Discovery is especially beneficial for two other reasons. First, it also includes information about the firms—including the firm footprint (e.g., local or national), size (number of branch offices as well as representatives), whether the firm offers annuities and insurance products, and some information about account sizes in that firm. Second, Discovery has also entries for advisers in the market who have *not* transacted FSP products—or might not even carry FSP products—and thus provides a complete snapshot of the subset of the advising market that could potentially carry annuities. A drawback of the Discovery dataset is that since we only currently have a snapshot in 2015, we have to restrict our analysis to window of time around this period to ensure that each adviser’s licensing information is likely to be accurate; we thus restrict **the analysis to 2013–2015**.

Table I provides summary statistics for advisers and FSP contracts sold in the relevant border

²³Recall that any adviser selling products on behalf of a wholesaler must be affiliated with a broker-dealer.

counties highlighted in Figure I that we will use in our preferred specifications.²⁴ About 21% of advisers are broker-dealers. BDs and RIAs each sell about 5.7 FSP contracts on average over the sample period; this number is close to the 75th percentile of 6, consistent with a mass of advisers selling significantly more contracts. **Conditional on selling an FSP annuity, BDs sell VAs about 79% of the time, while the proportion is somewhat larger for RIAs.** Contract amounts are also larger, by about \$30,000, for RIAs. Finally, the average client is around the age of retirement, with a slight difference of about 3 years between BDs and RIAs. This difference seems to persist across all quantiles of the distribution, although it may be of limited economic significance.

III.B. Product-Level Information

Since the transaction dataset from FSP contains (nearly) the exact description of the products for most transactions, we can match it to external data sources containing information about the products.²⁵ Variable annuities are required to file quarterly prospectuses with the SEC, along with updates to the prospectuses almost monthly. These prospectuses include detailed information about fees—including the mortality and expense fee, administrative expenses, surrender charges, etc.—along with investment options available to annuitants and detailed information about the charges associated with these investment options (e.g., expense ratios). Beacon Research, a data services company that provides disclosure software and curates product information for advisers and other financial firms, provided us with historical data for annuities in our sample. We also hand collected information about restrictions on investments, rider rules, and asset allocations from prospectuses stored in EDGAR, the SEC’s online database. We finally match subaccounts to data from the Morningstar Investment Research Center to collect information about fund ratings and investment styles, and we match it to the CRSP Survivorship-Bias-Free US Mutual Fund database for historical returns.

²⁴We make two main sample selection decisions. First, we exclude New York from our dataset, and thus counties that border only New York as well. New York does not impose common law fiduciary duty on its broker-dealers, but it does have a substantially different set of regulations surrounding the products that can be sold in the state. Indeed, financial services providers like FSP usually set a different suite of products in New York. Second, we only include contracts where we can identify the branch at which the adviser worked at the time of selling the contract, by cross-checking the entry in the transaction dataset with Discovery Data. This decision does not drop an especially significant number of contracts, and results are mostly unchanged.

²⁵The main item missing from our dataset is whether the annuity provides a joint survivorship benefit.

IV. Does Fiduciary Duty Affect Choices?

We leverage comparisons across state borders for both broker-dealers and registered investment advisers to estimate the effect of fiduciary duty on the composition of products sold in the market. Section IV.A discusses our empirical strategy. We then document compositional shifts on a number of dimensions. Section IV.B documents a shift away from variable annuities induced by fiduciary duty. Then, Section IV.C presents within-variable annuity comparisons of fees, investment options, returns, and net present value calculations.

IV.A. Empirical Strategy

Simple comparisons of product sales by broker-dealers between states that impose common law fiduciary standards and those that do not are tainted by the fact that fiduciary standards are not randomly assigned. If preferences for financial instruments have influenced the adoption of fiduciary standards, for example, 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 more similar to each other than the two states are. Second, we compare the difference across the border for broker-dealers to that for registered investment advisers, leading to a difference-in-differences strategy to determine whether fiduciary duty has an equilibrium impact. In particular, for a variety of characteristics Y_{ist} , we run the regression

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

where i represents an advisor, s a state, and t a transaction. In our preferred specification, we include contract-month fixed effects to address changes in interest rates over time, and add border fixed effects to use only within-border variation. We use the classification of fiduciary status from

Finke and Langdon (2012).

Within specification (1), there are three objects of interest. First is the straightforward difference-in-differences estimator, which is $\alpha_1 - \alpha_2$ 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 in the underlying demand for financial products. However, the difference-in-differences estimator should alleviate this concern: as long as the demand break is equal for broker-dealers and registered investment advisers, we would still expect $\alpha_1 - \alpha_2$ to be 0.²⁶ In the results in the following subsections, we will largely reject that $\alpha_1 - \alpha_2 = 0$ for most outcomes of interest, suggesting that fiduciary duty does indeed have an equilibrium impact. Moreover, under the assumption that there are no spillover effects onto registered investment advisers, one can interpret this difference-in-difference estimate as the causal effect of fiduciary duty on broker-dealers.

We interpret two further objects of interest in the regression above: α_1 and α_2 . Under the assumption that there are no demand breaks at the border, α_1 alone is the causal impact of fiduciary duty on broker-dealer sales, and α_2 can be interpreted as the spillover effect of broker-dealer fiduciary duty onto registered investment advisers. That is, interpreting α_1 and α_2 as causal effects requires no demand breaks at the border but provides the ability to accommodate spillover effects.

Overall, we find evidence in favor of significant causal impacts of fiduciary duty on broker-dealer sales, 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 close to zero for most outcomes. In Section VII, in which we analyze extreme outcomes for RIAs, we also find limited effects. Moreover, we find limited evidence throughout this paper for within-firm changes in the behavior of RIAs as well as on entry.

We also show four main arguments in favor of the assumption that there are no demand breaks at the border. First, many demographic characteristics are balanced across the border; Appendix B.1 provides the statistical tests. 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 a considerable amount of survey evidence arguing against this critique. Extensive survey evidence discussed in SEC (2011, 2013a,b) and Hung, Clancy, Dominitz, Talley, Berrebi, and

²⁶See Appendix B.4 for an explanation through the context of the model we develop in Section V.

Suvankulov (2008) suggests that consumers have very little information about which type of advisor 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 dually registered advisers—but the extent of this selection would have to vary significantly across state for this to be a legitimate concern. Third, one can test for differential selection by using client and contract characteristics as outcomes in equation (1). While we have limited information about clients in our dataset, we see no significant effects on 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 selection. Table B.3 in Appendix B.1 shows the results. Finally, the evidence that broker-dealer fiduciary duty has no spillover effects on RIAs also weighs in favor of no systematic breaks in demand existing across state borders. We believe that it is a priori unlikely that the demand break at the border exactly counteracts the spillover effect over a wide set of outcomes, and we thus argue that the border differences are interpretable in their own right.²⁷

We apply this strategy to three categories of outcomes to highlight that fiduciary duty has a compositional effect on the types of products sold. In Section IV.B, we study the effect of fiduciary duty on the choice of a variable, rather than a fixed indexed, annuity. While we view this shift mostly as evidence about general compositional effects, it may provide some suggestive evidence on consumer welfare: regulators and the popular press have often negative views of the financial value of variable annuities. However, we should be explicit that since variable and fixed annuities have multidimensional fee structures, and these fee structures are not comparable across the types of products, this outcome does not establish whether consumers are better off under fiduciary duty.

To address this issue, we focus on comparisons within variable annuities in Section IV.C. Prospectuses filed with the SEC provide us with details about the products and their historical rates, so we can compare the choice of product characteristics across state borders. These characteristics have welfare-relevant properties and get us closer to establishing welfare effects on consumers. Then, **we collapse all products into a single net present value calculation based on a model of optimal execution of the annuity by a risk-neutral individual.**²⁸ Using the same border strategy, the

²⁷The model does not put structure on how RIAs would behave in the presence of a difference across the border but in the absence of any direct impact from fiduciary standards. Appendix B.4 discusses these tests and finds support for the two sides of the border being similar.

²⁸Unfortunately, we are unable to conduct a similar analysis of fixed annuities due to data quality. Since fixed and indexed annuities do not have to file prospectuses with the SEC, there is no analogous archive of historical

difference-in-difference suggests there is an impact on these NPVs, and fiduciary status does cause broker-dealers to steer customers to higher NPV products.

IV.B. Types of Annuities Sold

A natural question to ask is whether fiduciary duty does *anything*, or whether it simply lowers adviser profits without impacting choices.²⁹ To address this question, we begin by comparing sales of variable versus fixed and fixed indexed annuities. This comparison is coarse, as there are dozens of variable and fixed/fixed indexed annuity products, but it allows us to establish in a parsimonious way that relevant changes are happening across markets with and without fiduciary standards. Moreover, these are two sets of products that provide similar benefits—the opportunity for growth leading to potential annuitization, with some safeguards for bequest in the case of early death—but are usually pitched as competing options in the popular literature on personal finance. Finally, variable annuities have received particular scrutiny in the popular press and by regulators.³⁰

Table II presents the results from Specification (1), where the left-hand side variable is a dummy for whether the transaction is for a variable annuity. Column (1) is our baseline specification, restricting to the border and including border fixed effects. The difference-in-difference estimate, in Row 1, shows that there is a significant impact of fiduciary duty on equilibrium sales. The magnitude is large, with a drop in VA sales of nearly 11 percentage points, or 12.5% of the base mean. Breaking the effect down into the BD and RIA effect separately, we report coefficients that correspond to α_1 and α_2 in Rows 2 and 3 of the table. We estimate an economically and statistically significant drop of 8.5 pp in the proportion of VAs that are sold by broker-dealers, which amount to 10% of the base mean. The estimate on the difference for RIAs suggests they have a similar propensity to sell variable annuities on either side of the border: the point estimate is about 2.3 pp with a reasonably small standard error. This is consistent with the fact that RIAs face the same regulatory regime and with the assumption that there are no preference changes at the border. Column (2) adds firm

information for fixed annuities. We attempted to make some progress with archived versions of rate sheets for fixed annuities on FSP's website, but our dataset is missing a large portion of products—especially ones that are distribution-channel specific. We are hesitant to draw conclusions from this partial list, especially given some predictions in Section VII depend on the tails of advice.

²⁹Detractors of the extension of federal fiduciary standards to broker-dealers have argued that this legislation will essentially add a set of forms for the customer to sign, without actually changing recommendations or choices.

³⁰See, for example, <https://www.thinkadvisor.com/2014/07/28/variable-annuities-a-top-source-of-customer-compla/?slreturn=20181123212558> or <https://www.finra.org/sites/default/files/InvestorDocument/p125846.pdf>.

Table II: Variable vs. fixed annuities

| | Border Counties | | All Counties | |
|----------------------|----------------------|-------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| DID | -0.109*** (0.038) | -0.043 (0.031) | -0.049*** (0.016) | -0.019 (0.013) |
| FD on BD | -0.085** (0.035) | -0.025 (0.033) | -0.072*** (0.020) | -0.035** (0.013) |
| FD on RIA | 0.023 (0.026) | 0.018 (0.012) | -0.022 (0.016) | -0.016*** (0.005) |
| Firm Fixed Effects | No | Yes | No | Yes |
| Border Fixed Effects | Yes | Yes | No | No |
| Base Group Mean | 0.869 | 0.869 | 0.877 | 0.877 |
| N | 22,803 | 22,781 | 215,967 | 215,925 |

Transaction-level regression of whether the contract is a variable annuity on a full interaction of fiduciary status and broker-dealer status as in Specification (1), with contract-month fixed effects and border fixed effects when restricting to the border in Columns (1) and (2). Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

fixed effects to the analysis to evaluate whether the effect persists even within firms. Including these fixed effects dampens the differences substantially—especially for broker-dealers—which suggests that much of the variation comes from differences across firms rather than differences in advisers within firms. We return to the issue of within-firm variation below. Appendix B.4 connects the regressions with firm fixed-effects to the model to validate the identifying assumption that both sides of the border are similar.

Columns (3) and (4) extend the analysis to the entire state and drop border fixed effects. The main difference when expanding the sample to the whole state appears to be one of magnitude, as border county differences are about twice as large as state wide differences. With firm fixed effects, the estimates are much smaller and indeed fairly close to zero. While we do not want to interpret the results in Columns (3) and (4) causally, as there are many potential confounding factors when comparing across whole states, the fact that the cross-state estimate is smaller in magnitude is reassuring since it suggests that the cross-border regression does not merely dampen unobserved differences across states. To be precise, one might worry that while counties on either side of the border are more similar than entire states, they are *still* unobservably different from each other in the same way states are different from each other. In this case, however, we would likely expect

that estimate off the border to have a *lower* magnitude than the cross-state effect. This concern is analogous to the concern one might have when successively including controls in a regression dampens the coefficient of interest. For the rest of this paper, we will focus mainly on regressions at the border county level.

Appendix B.2 performs several robustness checks for these results, among them adding New York transactions and focusing on advisers who only transact FSP products. Results are broadly consistent with those in Table II.

In this paper, we do not make claims about whether the shift to fixed and fixed indexed annuities is welfare-enhancing for clients. As mentioned earlier, it is not the case that one set of products strictly dominates the other. However, under the assumption of no discontinuity in preferences at the border it is quite stark to find such a large shift in the set of chosen products.³¹ This leads us to delve into an analysis of other measures of product quality in Section IV.C.

IV.C. Variable Annuity Characteristics

In this section, we run the same regression as in (1), but with the left-hand side replaced by various quality metrics. Table III shows outcomes for metrics related to fees. Column (1) shows results for the mortality and expense ratio, a yearly (percentage) fee that is taken from the contract amount. Column (2) shows the minimum expense ratio among all subaccounts offered in the variable annuity sold, and Column (3) shows the average. Column (4) shows the average surrender charge, which is the percentage of assets that would be paid out as a back-end fee for early withdrawal, for the surrender period.³²

The first row shows the difference-in-differences estimates. **Broker-dealers subject to fiduciary duty sell VAs with lower minimum but higher average expense ratios.** Breaking the effect down further, we find this result is driven by broker-dealers responding, not by a shift in outcomes for RIAs. The results in Row 2 of Table III shows a small decrease of 4.6 bp in the contract fee, off a mean of about 109 bp. While the minimum subaccount fee decreases by about 0.7 bp off the baseline of 50 bp, the *average* subaccount fee increases by about 6.2 bp. These opposing results

³¹Even without this assumption, we find a difference-in-differences coefficient of about the same magnitude as the border difference for broker-dealers.

³²The surrender charge changes as a function of years since contract purchase, but for FSP contracts it always drops to 0 within 10 years. As such, we report the average of the charge over these years, filling in zeros until year 10.

Table III: Variable annuity fees

| | Subaccount Expense Ratios | | | Surrender Charge (4) |
|-----------|---------------------------|---------------------|---------------------|-------------------------|
| | M&E (1) | Minimum (2) | Average (3) | |
| DID | -0.055 (0.038) | -0.006* (0.003) | 0.054** (0.022) | 0.214 (0.153) |
| FD on BD | -0.046 (0.035) | -0.007** (0.003) | 0.062*** (0.020) | 0.121 (0.158) |
| FD on RIA | 0.009 (0.020) | -0.001 (0.002) | 0.009 (0.010) | -0.093 (0.078) |
| Base Mean | 1.088 | 0.501 | 1.263 | 3.106 |
| <i>N</i> | 19,808 | 19,808 | 19,808 | 19,808 |

Mortality and expense ratios, subaccount expense ratios (minimum and average across subaccounts), and average surrender charges. Contracts are restricted to borders, specifications include border fixed effects, and standard errors are clustered at the state. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

can be traced back to **broker-dealers with fiduciary duty steering customers to products with more investment options**. Interestingly, we see that fiduciary duty tends to increase the average surrender charge by about 0.1% off a baseline of 3.1%, although the estimate is small and noisier than the others. We should note that unlike M&E ratios and expense ratios for subaccounts, the surrender charge is not necessarily paid out, and high surrender charges may be beneficial if the client is sure to not withdraw the money, as they always also imply lower fees.³³ Finally note that for Columns (1)–(3), the estimated difference in RIAs are fairly precise zeros, and the difference-in-differences estimate agrees in sign and magnitude (approximately) with the effect on broker-dealers.

As discussed earlier, an important driver of the returns of a variable annuity is set of investment options provided to investors. A drawback of our dataset is that we have no information on which investment options a client elects upon purchasing a variable annuity. We will thus first evaluate investment options using the philosophy that more choice is better. We also use 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. We consider a fund to be “high-quality” if it receives at least 4 stars and “low-quality” if it receives 2 or fewer. Second, Morningstar categorizes the “style” of both the equity and fixed-income investment

³³The fact that higher surrender charges are tied to lower fees precludes strict domination of a subset of products.

Table IV: Variable annuity investment options

| | # Funds | | # Equity Styles | | | | # FI Styles | | | Return | |
|-----------|--------------------|----------------------|----------------------|---------------------|-------------------------|---------------------|-------------------------|---------------------|----------------------|--------|--|
| | All (1) | $\geq 4\star$ (2) | $\leq 2\star$ (3) | High Quality (4) | Only Low Quality (5) | High Quality (6) | Only Low Quality (7) | Optimal (8) | Equal (9) | | |
| DID | 8.51* (4.25) | 3.83** (1.87) | 1.93 (2.06) | 0.748** (0.328) | -0.503* (0.249) | 0.274 (0.186) | -0.078** (0.034) | 0.0077* (0.0039) | 0.0014** (0.0006) | | |
| FD on BD | 10.90*** (3.88) | 3.57** (1.56) | 3.55 (2.15) | 0.762*** (0.260) | -0.565** (0.212) | 0.165 (0.171) | -0.091*** (0.029) | 0.0062* (0.0033) | 0.0010* (0.0005) | | |
| FD on RIA | 2.38 (2.20) | -0.26 (0.85) | 1.62 (1.30) | 0.014 (0.147) | -0.062 (0.127) | -0.109 (0.091) | -0.013 (0.015) | -0.0014 (0.001) | -0.0003 (0.0003) | | |
| Base Mean | 96.82 | 32.04 | 31.35 | 7.214 | 0.865 | 4.407 | 3.027 | 0.080 | 0.025 | | |
| N | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 15,785 | 15,785 | | |

Various investment quality metrics for the subaccounts in the variable annuities sold. Contracts are restricted to borders, specifications include border fixed effects, and standard errors are clustered at the state. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

of each fund. Each fund has one of nine potential styles based on where it lies on two dimensions.³⁴ We will interpret access to high quality funds of many different styles as evidence of quality.

Columns (1)–(3) of Table IV show effects on the number of investment options, disregarding restrictions on maximum allocations placed in each option. We estimate that fiduciary duty leads BDs to sell products with about 8.5 more funds, including almost 4 more “high-quality” funds (as measured by having a Morningstar rating of at least 4 stars), relative to the difference in RIA sales. However, more choice comes with costs: just as the average expense ratio increases, so does the number of low-quality funds (as measured by a rating of 2 stars or less), albeit by a small number that is noisily estimated. Column (4) shows that products sold by BDs under fiduciary duty have on average 0.76 more equity styles in which there is at least one high-quality investment (off a baseline of 7.2); furthermore, Column (5) shows there are fewer styles in which all options are low-quality. Columns (6) and (7) repeat the analysis for fixed-income styles, but the effects are noisier and of economically smaller magnitudes.

While Columns (1)–(7) implicitly assume a desire for diversification, Columns (8) and (9) instead simply tabulate effects on mean returns. For each subaccount, we estimate the mean return using historical data from CRSP, controlling for market returns; the procedure is described in Appendix C. This return is net of expense ratio, so funds with higher expense ratios are penalized. We then compute the returns attainable by the variable annuity under two assumptions. Column (8) studies the maximum mean attainable, subject to the investment restrictions imposed by the contract. Column (9) studies the mean that would be attained if the client invested equally across funds while meeting investment restrictions, which we interpret as a naive benchmark.³⁵ Both columns show a positive effect on the means, increasing the mean returns by about 4–8% of the base mean.

As in previous specifications, the results in Rows 1 and 2 are similar, meaning that the difference in within-broker-dealer means is similar to the difference-in-difference estimate. The third row results are essentially zeros, meaning that there are few estimated spillovers onto RIAs for all columns.

³⁴The dimensions are value vs. growth and large cap vs. small cap for equity; for fixed income, they are interest rate sensitivity and credit quality. More details about Morningstar’s methodology for style boxes can be found on http://www.morningstar.com/invGLOSSARY/morningstar_style_box.aspx.

³⁵Investment restrictions involve limiting the share of the investment that can be placed in various groups of the subaccounts. The outcomes in Column (8) are thus just solutions to a linear program. To compute the outcomes in Column (9), we minimize the share of the investment placed in the investment restriction group with the maximum required share, and then we allocate equally to each investment in the group.

Table V: Returns on variable annuity products

| | Optimal Portfolio Choice | | Equal Portfolio Choice | |
|-------------------|--------------------------|---------------------|------------------------|--------------------|
| | (1) | (2) | (3) | (4) |
| DID | 0.0051* (0.0027) | 0.0046* (0.0026) | -0.0010 (0.0009) | 0.0005 (0.0008) |
| FD on BD | 0.0038 (0.0024) | 0.0036 (0.0026) | -0.0000 (0.0009) | 0.0011 (0.0008) |
| FD on RIA | -0.0014 (0.0017) | -0.0009 (0.0010) | 0.0010** (0.0004) | 0.0006 (0.0004) |
| Contract-Month FE | Yes | Yes | Yes | Yes |
| Firm FE | No | Yes | No | Yes |
| Border FE | Yes | Yes | Yes | Yes |
| Mean of Dep. Var | 0.090 | 0.090 | 0.063 | 0.063 |
| N | 15,785 | 15,768 | 15,785 | 15,768 |

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

To aggregate these differences—and indeed take into account information that is even more difficult to incorporate into regressions, such as the behavior of riders that clients may purchase, or the effect of investment restrictions—we compute a metric for the value of the financial product to the annuitant. More specifically, we compute the net present value of each variable annuity contract for a risk-neutral individual who values money left to heirs equally as her own consumption. While we observe riders purchased by clients, we do not have any information about their realized execution: thus, we formulate and solve the dynamic programming problem to determine optimal execution by risk-neutral individuals and assume that all clients follow this strategy. Furthermore, we proceed using two possible assumptions on investment allocations. In the first approach, we assume that clients are choosing investments optimally.³⁶ In the second, we assume that clients are following the equal-allocation strategy outlined above. Details of this procedure are in Appendix D. For each product, age, and transaction account combination, we obtain a net present value.³⁷ For ease of interpreting these numbers, we calculate the annualized returns necessary in a fixed account

³⁶Optimal investment choice need not correspond to maximizing mean, even for a risk-neutral individual. Since many living benefit riders set floors on the income stream obtained upon retirement, even a risk-neutral individual may wish to trade off mean to increase variance. We search over points on the efficient frontier.

³⁷Forward simulation of the computed policy functions would yield a distribution of values over time. The computed value function would correspond to the mean of these simulations.

to achieve the same net present value by age 86.³⁸

Table V shows results with returns as an outcome. Under the optimal allocation rule, we find that fiduciary duty has a significant impact on broker-dealers, relative to RIAs: the difference-in-difference coefficient is 51 basis points, or about 5% of the mean return. That is, variable annuity contracts sold by broker-dealers with fiduciary duty are about 5% more valuable than the contracts sold by broker-dealers without fiduciary duty, relative to the corresponding difference in RIAs. The within-advisor difference is smaller and noisier, but has a similar magnitude. Under the equal allocation rule, we estimate no difference for broker-dealers, and find a negative point estimate for the difference-in-differences that is smaller in magnitude. Interestingly, we find that in these regressions adding firm fixed effects increases the point estimates for broker-dealers, but not appreciably for RIAs.³⁹

We should be clear that a role of financial advice may well be to help clients select optimal investment portfolios, or advise clients on optimal execution of riders. Our dataset does not allow us to investigate differential prevalence of such advice by fiduciary standards. To the extent that one believes that advisers with fiduciary duty are more likely to advise clients on these matters, our estimated effect on returns will underestimate of the true effect of fiduciary duty.

In summary, results in this section largely suggest that fiduciary duty tends to steer consumers to products with slightly lower fees (other than surrender charges), more investment options, and—depending on assumptions on how investments are chosen—higher returns.

V. A Model of Fiduciary Duty

Having established that fiduciary duty shifts the set of products being purchased by consumers, a natural question to ask is whether this shift is due to the advice channel or to the fixed cost channel. This section develops a model of fiduciary duty with heterogeneous firms and the possibility of entry.

³⁸That is, we find the return R such that

$$(1 + \beta)^{86-A} \cdot (\text{Net Present Value}) = (1 + R)^{86-A} \cdot (\text{Transaction Amount}), \quad (2)$$

where A is the annuitant's age and β is a discount rate chosen to be 0.05. Note that 85 is the oldest age that these contracts can be purchased. Furthermore, note that this metric mechanically produces high levels of R , as contracts with living benefit riders and contracts that are annuitized continue to pay out after age 86. Nevertheless, since our main interest is in differences across contracts, this is not a concern.

³⁹One may speculate that the true allocations are somehow more informed than the equal allocation rule, but perhaps optimally selected. In that case, we may imagine that the true effect of fiduciary duty on net present values lies between these two estimates.

The model shows that improvements in mean advice quality can be rationalized by either channel, so that the results in Section IV do not allow us to identify the channel through which fiduciary duty operates. Furthermore, the model provides testable implications of the presence of an advice channel, which we can then take to the data.

V.A. Elements of the Model

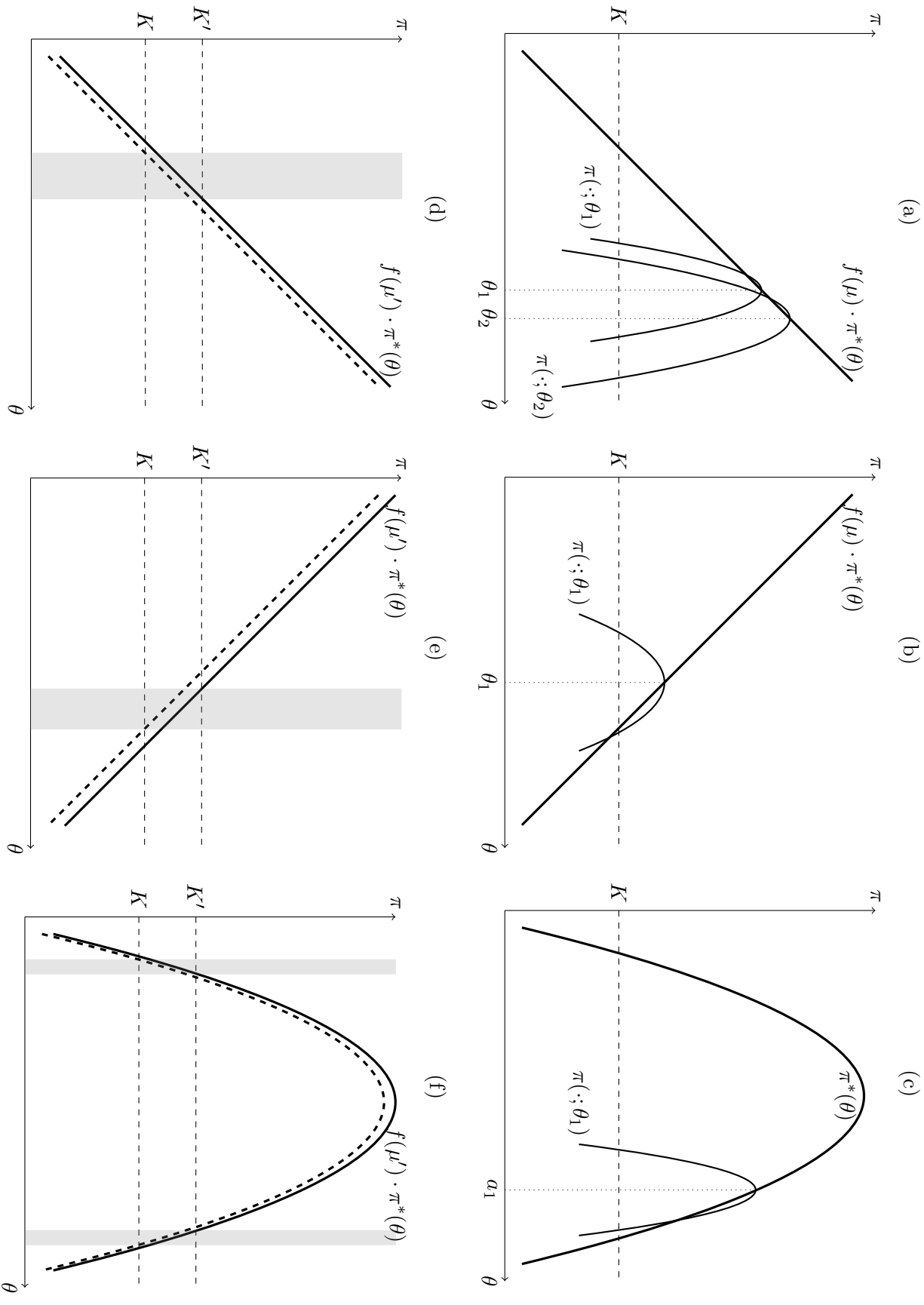
Suppose initially that all firms are broker-dealer firms; we gradually relax assumptions in Appendix A.2 and formally introduce registered investment advisory firms into the analysis in Appendix A.3. Each firm j has a type $\theta_j \in [0, 1]$ and can choose advice $a \in [0, 1]$; the distribution of types of potential entrants is $H(\cdot)$, which we assume is continuous, and we abuse notation by letting $H(S)$ denote the mass of types in set S . We adopt the convention that higher values of a correspond to worse or more distorted advice. A firm of type θ_j has a per-consumer single-peaked profit function $\pi(a; \theta_j)$, and we define types so that θ_j is the maximizer of $\pi(\cdot; \theta_j)$. Upon entering, therefore, a firm of type θ_j will set advice $a = \theta_j$ and earn base profits $\pi^*(\theta_j) \equiv \pi(\theta_j; \theta_j)$. Firms have to pay a fixed cost K to enter the market.

For some intuition for why the maximand of $\pi(\cdot; \cdot)$ is interior, one may think that worse advice corresponds to more profitable products for the advisory firm but increases the chance of legal recourse. We are agnostic about from where differences in θ_j arise. Firms may be differentially susceptible to legal recourse. They may have negotiated different commission schedules with wholesalers and may also provide different splits of the commissions to the individual advisers. They may also place different levels of emphasis on reputational considerations. The key aspect of this model is that in the pure fixed cost channel of fiduciary duty that we define below, shifts in K are not correlated with θ_j .⁴⁰

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 II(a)–(c) illustrates three possibilities for $\pi^*(\cdot)$ and sample graphs of $\pi(\cdot; \cdot)$. A natural prior is that case (a) is most plausible, with “worse” advice corresponding to the highest commissions and thus higher profits. However, it may be that higher θ firms also face a different set of consumers, or perhaps that national firms earn higher

⁴⁰In Appendix A.2, we analyze an extension of the model where different sets of firms get different levels of increases in fixed costs.

Figure II: 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 $\pi_i(\cdot; \cdot)$ 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.

profits and also have reasons to distort advice less. Again, as long as these differences are not correlated with the effect of fiduciary duty on fixed cost (discussed below) they can all be subsumed in θ_j , and cases such as (b) and (c) are also plausible.

If the mass of firms who enters a market is μ , then the profit of a firm of type θ_j is

$$f(\mu) \cdot \pi^*(\theta_j) - K,$$

where $f(\cdot)$ is decreasing in μ and independent of θ . We can conceptualize $f(\cdot)$ as the number of customers a firm receives if a mass μ enters, and K is the fixed cost of entry.⁴¹ Denote by $\mathcal{E}(\mu, K)$ the set of θ_j who would enter if they all believe that a mass μ of firms will enter and the fixed cost is K . Then, in an equilibrium a mass $\mu^*(K)$ of firms would enter such that

$$H(\mathcal{E}(\mu^*(K), K)) = \mu^*(K).$$

Let $\mathcal{E}^*(K) \equiv \mathcal{E}(\mu^*(K), K)$ be the set of types that enter in equilibrium when the entry cost is K . Appendix A provides a straightforward argument that the equilibrium exists and is unique.

V.B. The Fixed Cost Channel

Suppose fiduciary duty operates through a *pure fixed cost* channel: imposing fiduciary duty increases costs from K to K' for all θ but does not alter $\pi(\cdot; \cdot)$ (or the distribution of types of potential entrants) in any way. This increase in fixed costs could correspond to having to purchase compliance software, the increased concern of legal exposure, increase in paperwork, more overhead time required to deal with regulatory hassles, etc.⁴² What predictions can we make on the set of advice given in the market? First, given the framework, increasing fixed costs does not affect the advice that would be profitable for a type θ_j , conditional on entry: this will suggest a firm-level test for the

⁴¹Importantly, $f(\cdot)$ is not directly a function of whether the market imposes fiduciary duty on its advisers. This assumption is consistent with survey evidence (SEC, 2011, 2013a,b) that clients are largely unaware of the fiduciary status of their adviser, much less the variation in fiduciary standards by location.

⁴²In this section, we write the change in fixed costs as a change to the fixed costs of entry. In the baseline model, 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 $\pi(\cdot; \cdot)$ to $\pi(\cdot; \cdot) - c$. 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.

channel through which fiduciary duty operates. Second, an important comparative static, on which our market-level tests for the channels of fiduciary duty will be based, is that if $K' \geq K$ then

$$\mu^*(K') \leq \mu^*(K) \text{ and } \mathcal{E}^*(K') \subseteq \mathcal{E}^*(K). \quad (3)$$

Intuitively, increasing the fixed cost forces the base profitability of the marginal entrant to increase. Since the set of entrants is the set of types weakly more profitable than the marginal entrant, the set of entrants weakly shrinks. The formalization of this result is in Appendix A. Let $\underline{\theta}(K) \equiv \min \mathcal{E}^*(K)$ be the minimum type that enters with a fixed cost of K and $\bar{\theta}(K) \equiv \max \mathcal{E}^*(K)$ be the maximum. An implication of (3) is that if $K' \geq K$, then $\underline{\theta}(K) \leq \underline{\theta}(K')$ and $\bar{\theta}(K) \geq \bar{\theta}(K')$. Since types are one-for-one with advice, if fiduciary duty operates through a pure fixed cost channel, imposing fiduciary duty must weakly improve the worst advice in the market and weakly reduce the best advice.

This baseline model is simple, but lacks many reasonable features of the market for financial advice. In Appendix A we allow for such extensions and show that that the inclusion in (3) continues to apply, sometimes with slight modifications. In particular, we determine that the condition continues to apply if firms have idiosyncratic shocks to their base profit functions, if firms serve heterogeneous consumers and as a result optimal advice varies, if under the fixed cost channel the magnitude of the increase in fixed costs varies by firms, and if competition improves advice quality. We also extend the model to allow for the presence of registered investment advisers who compete with broker-dealers. The key connection between these generalizations is that the 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, which leads to shrinking the set of advice observed in the data.

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 can be traced back to the fact that we are not taking any stance on the shape of $\pi^*(\cdot)$ or $H(\cdot)$. Panels (d)–(f) of Figure II illustrate the dynamics of increasing the fixed cost in the settings of panels (a) through (c). 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. The

types that exit are the ones in 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.

V.C. The Advice Channel

Another channel through which fiduciary duty may operate is an *advice channel*, which is arguably the intended channel. **The advice channel would make it differentially more costly to offer low-quality advice to clients.** Thus, unlike a pure fixed cost channel, an advice channel could alter the ordering of profitability of types. To model this advice channel in the base scenario (in which firms differ along a single dimensional type), we assume that there is a cost function $c(a)$ such that the profit to type θ_j from giving advice a is $\pi(a; \theta_j) - c(a)$, where $c(a)$ is increasing in a so that worse advice is more costly.⁴³

Under an advice channel of fiduciary duty, the optimal advice $a_{FD}^*(\theta_j)$ given by type θ_j weakly improves: $a_{FD}^*(\theta_j) \leq \theta_j$.⁴⁴ This leads to a firm-level prediction: if fiduciary duty is imposed on a market, firms that remain in the market must **weakly improve their advice.**

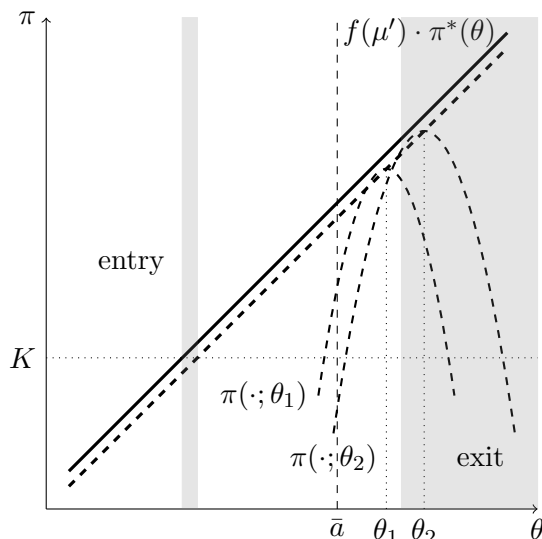
Our second observation is that the predictions on the extreme values of advice need not hold under an advice channel. As an illustration, suppose $c(\cdot)$ is such that fiduciary duty places a cap on advice: $c(a) = 0$ for $a \leq \bar{a}$ and $c(a)$ is infinite for $a > \bar{a}$. Figure III illustrates that firm with sufficiently moderately high values of θ_j (e.g., θ_1) will be forced to adjust their advice to \bar{a} , which those with especially high values of θ_j (e.g., θ_2) will be forced to exit the market. However, the exit of such firms will induce low- θ_j firms, who were otherwise not profitable enough, to enter the market. Thus, $\bar{\theta}$ decreases, and since $a^*(\theta) \leq \bar{\theta}$, the advice given by this type improves. Thus, the advice channel effectively handicaps high- θ_j firms, and the highest-quality advice can actually improve. This is impossible if fiduciary duty were to operate through a pure fixed cost channel.

Note that it is still possible for both extremes of the advice distribution to contract, just like in

⁴³Note that the predictions in the case where $c(\cdot)$ is flat are identical to those in a pure fixed cost channel, and we will thus not say an advice channel is present in such a situation.

⁴⁴Consider the function $g(a, \lambda) = \pi(a; \theta_j) - \lambda c(a)$. Let $a^*(\lambda)$ be the maximizer of $g(a, \lambda)$. Note that $g(a, \lambda)$ has weakly decreasing differences in (a, λ) since $c(\cdot)$ is weakly increasing. Then, it must be that $a^*(\lambda)$ is decreasing in λ . The result follows from $\theta_j = a^*(0)$ and $a_{FD}^*(\theta_j) = a^*(1)$.

Figure III: Illustration of the advice channel



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 to enter since the effective profit function increases due to the exit of these types.

a pure fixed cost channel. 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.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.

V.D. The Importance of Distinguishing These Channels

Why is it important to distinguish these channels, aside from the inherent interest in understanding how an important policy operates? We should note that from the perspective of quantifying the effects of a *particular* policy, it does not matter whether net change in advice comes from a firm that changed its behavior in response to the standard or from a different firm that was able to enter only because others could not. However, the channel is especially important from a regulatory perspective, if we would like to **predict the effects of tightening fiduciary standards**. In particular, extending fiduciary duty at the federal level to broker-dealers may lead to a standard of care that

Figure IV: Distinguishing the pure fixed cost and the advice channels

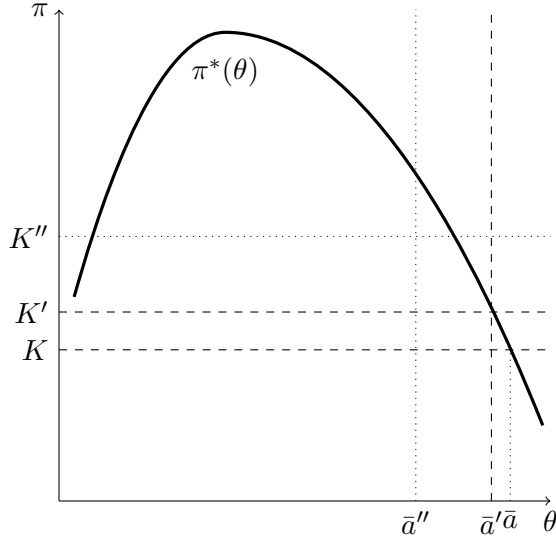


Illustration of a profit envelope under which strengthening fiduciary standards will lead to different results under a pure fixed cost channel and an advice channel (proxied by a cap)

is more stringent than that of common-law fiduciary duty.⁴⁵ Consider the situation depicted in Figure IV, and suppose that in the baseline market without any fiduciary standards, the maximum advice is given by \bar{a} . Imposing fiduciary standards moves the maximum advice to \bar{a}' . The results could be rationalized by either a fixed cost moving to K' or a cap of \bar{a}' being imposed through fiduciary standards.⁴⁶ However, if the regulator wishes to make the same policy more stringent, the two channels would offer different predictions. In an advice channel, tightening the cap to $\bar{a}'' < \bar{a}'$ would push low-quality advice out of the market. Tightening a fixed cost channel to $K'' > K'$ would *also* cause especially high-quality advice to exit the market. A regulator could avoid this situation by estimating the empirical counterpart of $\pi^*(\cdot)$ or limit it by ensuring that fiduciary duty does not operate through a pure fixed cost channel.

Furthermore, 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, while in the latter, whether average advice increases or

⁴⁵Furthermore, 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 to the same standards. Proposed state *legislation* (rather than common law) is also anecdotally of different stringencies.

⁴⁶The figure abstracts away from scalings of the effective profit function induced by entry, for simplicity.

decreases depends on whether more low-quality or high-quality advice firms are displaced. This hinges crucially on $H(\cdot)$ and on the shape of $\pi^*(\cdot)$, objects that may be quite heterogenous across markets.

V.E. Mapping the Model to Data

The model provides testable conditions under which we can reject the notion that fiduciary duty operates through a pure fixed cost channel, and conditions under which an advice channel must be present. Summarizing the discussion above, consider two identical markets, but for the fact that one does not impose fiduciary duty on broker-dealers and the other does. If fiduciary duty were to operate purely through a fixed cost channel, we would have the following two predictions:

1. If a specific broker-dealer firm enters both markets, it offers the same advice in both.
2. The highest-quality advice offered by any broker-dealer in the market with fiduciary duty is (weakly) lower than that offered in the market without. The lowest-quality advice offered by any broker-dealer in the market with fiduciary duty is (weakly) higher than that offered in the market without.

Furthermore, if fiduciary duty constrains low quality advice, we have the following predictions:

3. If a specific broker-dealer firm enters both markets, it offers weakly better advice in the market with fiduciary duty.
4. A sufficient condition for the presence of an advice effect is that the highest-quality advice offered by any broker-dealer in the market with fiduciary duty is strictly higher than that offered in the market without.

It is important to stress that 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. We focus on testing the hypothesis that there is no advice channel.⁴⁷

As discussed earlier, in Appendix A we extend this baseline model in several directions, mostly without changes to the previous predictions. One exception to this statement occurs if one assumes

⁴⁷When taking the model to the data, we will use the computed returns of the annuity as our metric for the “quality” of advice, to use the term adopted in the model.

that there are multiple types of broker-dealers, such as local and regional, and that the magnitude of the fixed cost channel differs by type. In this case, predictions 2 and 4 only hold for broker-dealer types whose share of the market does not expand due to competitive effects. Below we show that no broker-dealer type expands with fiduciary duty, so these predictions continue to hold. A similar result emerges when competition directly improves advice. Under this extension, if we see the mass of firms decreases upon imposing fiduciary duty (which we do empirically), then it is not possible to rationalize an improvement in the best advice through a pure fixed cost channel.

However, if competition actually directly harms advice, our model predictions no longer hold. Given there is no motive to undercut competitors on price by offering a worse product—unbeknownst to the customer—we find it a priori more likely that competition will increase quality.⁴⁸ However, the literature on credence goods and information disclosure does highlight that the effect of competition on outcomes depends on the details of the model (Dulleck and Kerschbamer, 2006). Crucially, under the assumption that competition worsens advice for all adviser types, then the fact that we observe fewer firms in markets where broker-dealers have fiduciary duty implies that we should also expect to see an improvement in the *worst* advice in the market, which is a testable implication we can reject in Section VII. However, it could be the case that competition worsens advice for some adviser types, excepting those who provide the worst advice in the market. Under such a model, the above predictions fail to hold.

Moreover, it is important to stress that the model in this section is not fully general. Nevertheless, we find the core intuition robust and the model to be a useful tool to both formalize and test potential mechanisms.

VI. Does Fiduciary Duty Affect Market Structure?

In this section, we empirically evaluate the concern that fiduciary duty increases the “cost of doing business” and impacts market structure: critics of 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. Given the absence of time series variation in common law fiduciary duty, our analysis is again cross-sectional. However, we will use a strategy

⁴⁸Recall that payments to advisers here mostly come from financial services providers, not customers, so that prices and quality are the same object.

Table VI: Composition of firms, by type

| | (1) Total Firms | (2) BD Firms | (3) RIA Firms | (4) % BD Firms |
|--------------------------------|--------------------|---------------------|-------------------|-------------------|
| $\mathbb{1}[\text{Fiduciary}]$ | -0.092 (0.069) | -0.157** (0.076) | -0.037 (0.068) | -0.072 (0.052) |
| N | 411 | 411 | 411 | 337 |

Columns (1)-(3) show regressions of the number of firms of each type (using the $\log(x+1)$ transformation) on a dummy for fiduciary status of the county. Column (4) shows results of an OLS regression of the proportion of BD firms on the same covariates. All specifications have border fixed effects, control for the log population, log median household income, and median age at the county level. Standard errors are clustered at the border level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

similar to the previous sections of the paper to control for unobservable demand or cost shifters. Taking a market to be a county, we will compare counts of firms per county on either side of the relevant border, controlling for border-level fixed effects. We will further study whether fiduciary duty affects the types of firms who enter on either side of the border. Henceforth, we will maintain the identifying assumption that markets on either side of the border are identical but for fiduciary duty, relying on the small differences in RIA behavior at the border discussed in Section IV as the primary justification.⁴⁹

We expand our sample beyond those advisers and firms who have transacted with FSP and use the Discovery dataset, which provides a snapshot of all registered financial advisers in 2015 able to sell annuities. We say an adviser has entered a market if the adviser is marked as actively selling financial products by Discovery. We consider a firm to have entered a market if it employs at least one adviser who has entered the market. Our main specification is a regression at the county level of the (log of one plus the) number of firms of a particular type on a dummy for the fiduciary status of the county, with fixed effects for the border and a control for the log of the population.⁵⁰ We also regress the proportion of firms that are broker-dealer firms, conditioning on the set of counties where there is at least one entrant. Table VI shows results of these regressions.

Columns (1)–(3) of Table VI show evidence of both a level and a compositional effect of fiduciary duty on market structure. The point estimate of fiduciary duty suggests that **imposing fiduciary duty reduces the total number of firms in the market by about 9%**, although the estimate cannot

⁴⁹Appendix B.4 provides further model-based justification for this assumption.

⁵⁰Poisson regressions return similar results to the ones presented in this section.

rule out a zero effect at the 10% level. Columns (2) and (3) suggest that this level effect comes primarily from a drop in the number of broker-dealer firms, which are affected by the regulation. The number of such firms drop 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 dually registered firms. Column (4) puts these results together and shows a compositional effect of fiduciary duty: we find a a modest decrease, of about 7 pp off a baseline of 31%, in the proportion of firms that are broker-dealers in states in which broker-dealer advisers have fiduciary duty.

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, Appendix A.2 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 VII 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 VI. 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 compositional effect among dually registered 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.

Table VII: Number of firms, by footprint

| | (1) Local | (2) Multistate | (3) Regional | (4) National |
|-----------|---------------------|---------------------|---------------------|---------------------|
| All Firms | -0.133* (0.0702) | -0.0657 (0.0495) | 0.0036 (0.0577) | -0.0398 (0.0580) |
| BD Firms | -0.115* (0.0681) | -0.0277 (0.0324) | -0.0190 (0.0485) | -0.0645 (0.0679) |
| DR Firms | -0.0225 (0.0175) | -0.0483 (0.0485) | 0.0173 (0.0483) | -0.0296 (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 coefficient 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. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In Appendix B.3, we study the related question of whether fiduciary status affects the probability of entry of different types of firms, taking a stance on who potential entrants are in each county. **We find that fiduciary duty decreases the probability of entry for all broker-dealers.** When splitting this difference by firm footprint, the effect is stronger for local broker-dealers than those of other footprints, although the estimates are noisy. These results are broadly consistent with the observations in Table VII. While these regressions are conducted in the absence of an explicit structural interpretation, one could think of border fixed effects as controlling for the expected number of rival firms in the market as in a standard entry model. A major difference between this specification and workhorse models such as Seim (2006) is that in our case the location of rivals over counties in the border cannot affect expected profitability of potential entrants.⁵¹

While fiduciary duty leads to a contraction in the number of broker-dealers and a smaller (albeit noisily measured) contraction in the total number of firms, does it cause a contraction in the market for annuities? To analyze this question, 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 variable annuities at the county, which FSP has provided us through its membership in a consortium of annuity providers;⁵² (ii) total number of FSP contracts sold; and (iii) total dollar

⁵¹One may also wonder about the number of individual advisers in the market. We can repeat the analysis using counts and proportions of advisers of each type. We find small but especially noisy *positive* effects on the number of BD and RIA advisers. This can be attributed to the fact that national firms often enter with teams of advisers, which mechanically increases the number of individual advisers.

⁵²We do not have data on total annuity sales by county.

Table VIII: Total sales

| | All Products | FSP Products | |
|--------------------------------|------------------|----------------------------|--------------------|
| | VA Sales (1) | Number of Contracts (2) | Total Sales (3) |
| $\mathbb{1}[\text{Fiduciary}]$ | 0.001 (0.049) | -0.023 (0.064) | 0.043 (0.046) |
| Mean of Variable | \$51.1 M | 55.5 | \$8.1 M |
| N | 411 | 411 | 411 |

Regression of various metrics for total sales 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. 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. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

sales of FSP annuities. Table VIII provides results of these regressions, and we find limited effects on market size. Despite the proportional shift away from variable annuities (for broker-dealers), we estimate a zero effect of fiduciary status on dollar sales of variable annuities (across all providers). The standard errors allow us to rule out especially large shifts of 10% in either direction with 95% confidence. We do not have data on sales of fixed and indexed annuities outside FSP, so Columns (2) and (3) focus on total FSP sales. We estimate a small negative impact of fiduciary status on the number of annuity contracts sold by FSP and a larger positive impact on total dollar sales of FSP annuities. Both estimates, however, are statistically indistinguishable from zero.

In summary, evidence from the relevant borders suggests that fiduciary duty does reduce the number of broker-dealer firms operating in a market, with no strong effects on the number of dually registered firms. This leads to a decrease in the total number of firms in a market, although the magnitude of this decrease is estimated noisily. Moreover, we find that most of the incidence of the regulation falls on smaller, local broker-dealers. On net, however, we find limited effects of fiduciary duty on the total size of the market—both in terms of products sold and in terms of the total dollar amount of the products sold.

VII. Analysis of the Mechanism

In this final section, we first implement the tests motivated by the model in Section V for the presence of an advice channel. We then use the structure of the model to provide further evidence on the validity of the border-county strategy.

VII.A. Market-Level Tests

We start with market-level tests proposed in Section V.E. These tests are based on the support of the distribution of advice given in identical markets with and without fiduciary duty. To take these predictions to the data, we first need a measure of what we refer to in the model as the quality of advice: since it is most useful if the measure is continuous, we use the return on variable annuities assuming optimal allocation. Second, we make this metric comparable across borders by partialling out border fixed-effects, essentially demeaning the metric within-border. Finally, we need methods to proxy the support of the distribution of advice.

In this section, we proxy the support by (i) extreme quantiles and (ii) share of mass in the distribution above particular (extreme) levels. To formalize our decision to look at quantiles and shares of mass, suppose that we have two distributions A and B with the maximum of the support of A strictly less than the maximum of the support of B . Letting Q_T be the quantile function of $T \in \{A, B\}$, we thus know that $Q_A(1) < Q_B(1)$. As long as the quantile functions is continuous, $Q_A(\alpha) < Q_B(\alpha)$ for sufficiently high α as well. Similarly, if we let the maximum of the support of A by M_A , we know that $F_A(M_A) = 1$ and $F_B(M_A) < 1$, where F_T is the cdf of T . Thus, for sufficiently high values x , we must have $1 - F_A(x) < 1 - F_B(x)$ as well, by continuity. Of course, we do not have much guidance on which values of (normalized) advice or quantiles to pick, so we present results with a variety of such choices. All confidence intervals are constructed by bootstrapping the sample by resampling within-county.

Table IX shows the quantiles for this normalized distribution in regions with fiduciary duty, as well as the difference between the regions with and without fiduciary duty.⁵³ Columns (1)–(3) show results for high quantiles. We estimate a statistically and economically significant expansion in

⁵³Since the entry model is at the firm level, we categorize advice by the regulatory status of the firm rather than the adviser in this section. Results are qualitatively—and usually even quantitatively—similar if using the adviser’s status instead.

Table IX: Differences in quantiles

| | High Returns | | | Low Returns | | |
|----------------|------------------------|-----------------------|---------------------|---------------------|-----------------------|---------------------|
| | 90% (1) | 95% (2) | 99% (3) | 1% (4) | 5% (5) | 10% (6) |
| BD Value | 0.0148 (0.0020) | 0.0196 (0.0020) | 0.1057 (0.0335) | -0.0364 (0.0030) | -0.0310 (0.0015) | -0.0281 (0.0012) |
| BD Difference | 0.0078*** (0.0024) | 0.0151*** (0.0031) | 0.0025 (0.0590) | -0.0038 (0.0036) | -0.0045** (0.0020) | -0.0015 (0.0018) |
| RIA Value | 0.0219 (0.0004) | 0.0326 (0.0014) | 0.1651 (0.0320) | -0.0383 (0.0018) | -0.0322 (0.0005) | -0.0285 (0.0005) |
| RIA Difference | -0.0019*** (0.0007) | -0.0012 (0.0027) | -0.0043 (0.0514) | 0.0004 (0.0007) | 0.0004 (0.0006) | 0.0008 (0.0006) |

Quantiles of the distribution of returns for broker-dealers and investment advisers without fiduciary duty, and the change in the quantiles with fiduciary duty. Standard errors are computed by bootstrapping, with resampling within county, and significance is only reported for the differences. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

the sale of high-return products by broker-dealers when considering the 90th and 95th percentiles. As argued in Section V, this expansion cannot be consistent with fiduciary duty operating *purely* through a fixed cost channel. The point estimate on the effect on the 99th percentile is smaller but positive, but both the quantile and the difference are estimated especially noisily. Columns (4)–(6) present the effects on especially low returns. Here, we do estimate a small expansion in *low* returns as well when looking at the 5th percentile, as well as a small and noisy negative number for the 1st percentile. First, we should note that such expansion in advice—even at the end of low returns—is also inconsistent with a pure fixed cost channel and can be rationalized by an advice channel in which newly entering firms do occasionally offer products with lower returns. However, we should also note that the magnitude of the effect on low returns is considerably smaller than than on high returns. Moreover, we do not see any appreciable effect on the 10th percentile.

The third and fourth rows of Table IX present the effects on advice provided by registered investment advisory firms. Recall the under either channel, we would expect a weak expansion in both high and low returns provided by these firms, as fiduciary duty only impacts RIAs through entry. Results in Section VI suggest that entry by RIAs, however, is at best limited, and we accordingly see especially small effects on the support of returns for products sold by RIAs. While without parameters, the model does not provide any quantitative predictions on the relative changes

Table X: Differences in shares of extreme advice

| Cutoff | High Returns | | | Low Returns | | |
|----------------|---------------------|---------------------|----------------------|----------------------|----------------------|-------------------|
| | 0.010 (1) | 0.015 (2) | 0.020 (3) | -0.010 (4) | -0.015 (5) | -0.020 (6) |
| BD Proportion | 0.126 (0.015) | 0.098 (0.013) | 0.047 (0.009) | 0.486 (0.022) | 0.398 (0.023) | 0.293 (0.020) |
| BD Difference | 0.119*** (0.019) | 0.095*** (0.021) | 0.076*** (0.016) | -0.114*** (0.027) | -0.078*** (0.025) | -0.040 (0.026) |
| RIA Proportion | 0.217 (0.006) | 0.167 (0.006) | 0.121 (0.004) | 0.373 (0.008) | 0.312 (0.007) | 0.248 (0.007) |
| RIA Difference | -0.010 (0.008) | 0.014 (0.009) | -0.021*** (0.006) | 0.008 (0.011) | -0.007 (0.009) | -0.015 (0.010) |

Returns are demeaned by the mean return in the border. The first and third rows report the proportion of returns above (for high returns) or below (for low returns) cutoffs, in the region without fiduciary duty. The difference is the change the share when moving to the region with fiduciary duty. Standard errors are computed by bootstrapping, with resampling within county, and significance is only reported for differences. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

in advice by BDs and RIAs, it is intuitively consistent that broker-dealers are affected more strongly by a regulation that has direct incidence on them.

Table X uses the share of returns above and below cutoffs as another proxy for the upper bounds of the supports of the distributions with and without fiduciary duty. As before, the mean return of all transactions at the border is subtracted before reporting these percentages. The results are broadly similar to the ones with quantiles. We see substantial and statistically significant increases in the proportion of returns that is above particular cutoffs for broker-dealers. We also see noticeable decreases the share of low returns,⁵⁴ although we estimate a reasonably precise zero for the most extreme cutoff. For RIAs, this metric estimates mixed effects on high returns and no significant effect on the low end of returns. All point estimates are much smaller than the effect on broker-dealers. Once again, these results are consistent with the advice channel on fiduciary duty being empirically relevant.

We should discuss two concerns brought up at the end of Section V.B. First, even if fiduciary duty were to operate through a pure fixed cost channel, we may well expect local, regional, and

⁵⁴As a clarification, recall that a negative number in the low returns section in Table X corresponds to a decrease in low return while a negative number in Table IX corresponds to a decrease in the quantile and thus an expansion in low returns.

national firms to have different shocks to their fixed costs. Appendix A.2 shows that if the number of firms within the same “group” shrinks as a result of fiduciary duty, then the pure fixed cost channel would still predict an overall contraction in advice—and thus the extremes of advice as well—since there would be a contraction in advice within-group. Given that Table VII shows no evidence of expansion of broker-dealers of any footprint, a contraction in advice is still a valid prediction of the pure fixed cost channel. Second, one might be worried that the improvement in the highest-quality advice—as measured by returns—is due not to an advice channel induced by regulation but rather a direct effect that reduced competition directly improves advice. However, if we believe that this direct impact of competition affects all types, then we would expect even the lowest returns in the market to improve in a pure fixed cost channel: the worst types in the market would improve (due to exit), and the types that remain in the market would further improve their advice due to lessened competition. The fact that we do not see this effect in Table IX, where if anything the worst return worsens slightly, is suggestive evidence against this concern. We also do not see a statistically significant effect in the most extreme cutoff in Table X.

VII.B. Firm-Level Tests

Another prediction of the fixed cost channel is that behavior at the firm level should not change across the border, for firms on both sides of the border. Significant changes in behavior at the border within-firm—e.g., by changing the composition of products towards ones that have higher returns or more investment options—would be indicative of the advice channel. Throughout the body of the paper, we have included regressions with firm fixed-effects. The strongest evidence of within-firm changes in advice comes from Column (2) of Table V, which looks at results on our baseline metric for advice. It shows a positive point estimate of 36 basis points (with a standard error of 26 bp)—about the same as the estimate without firm fixed effects—on broker-dealer firms, providing somewhat noisy evidence that products transacted adjust towards higher returns even within firm. The point estimate on RIAs is closer to zero. Comparing Columns (3) and (4) shows that the point estimate under equal portfolio choice is larger with firm fixed effects, but small and noisy as well. Interestingly, Column (2) of Table II shows that the within-firm effect for the class of product—variable or fixed indexed annuity—sold does not respond as strongly within firm as it does across the entire market. We estimate a point estimate of a decrease in 2.5 pp for selling a

variable annuity, relative to 8.5 pp across firm.

However, the drop in the point effect by about 75% seems to be the exception across outcomes. Table B.6 in Appendix B.5 includes the full battery of outcomes investigated in Section IV but runs all regressions with firm fixed effects. The general observation is that while the point estimates are usually dampened relative to the estimate without firm fixed effects, they are often still significant and almost always share the same sign. Indeed, a considerable portion of the net change observed is due to within-firm changes, which lends further credence to the presence of an advice channel.

VIII. Conclusion

This paper evaluates the effects of extending fiduciary duty to broker-dealers on the set of products consumers purchase, on the quality of purchased products on a variety of dimensions, and on market structure. This question is motivated by the recent regulatory discussion around expanding fiduciary duty to include 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 shifts the set of products purchased by investors away from variable annuities and towards fixed and fixed indexed annuities.** We then focus on variable annuities and find that fiduciary duty leads broker-dealers to sell products with more investment options and higher returns. Finally, we show that fiduciary duty causes exit of broker-dealers from the market, with the incidence most heavily slanted towards local broker-dealers. 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 do not directly speak to the **mechanism** at play. To uncover this mechanism, we develop a simple model of firms choosing to enter a market

and selecting their advice. This model provides a framework for understanding various mechanisms, and it identifies properties of the *distribution* of advice in the market that are informative of the channel. Using this model, we argue that the distribution of products sold as well as the composition of the entrants provides evidence that the advice channel—in which fiduciary duty directly constraints advice—is empirically relevant. **That is, fiduciary duty does not simply increase fixed costs. These results also provide suggestive evidence that further increases in the stringency of fiduciary standards—which could be a natural conceptualization of the regulatory changes under consideration in various agencies—would continue to impact advice similarly.**

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A. Further Analysis of the Model

A.1. Only Broker-Dealers

Consider the model outlined in Section V.A. There is a continuous distribution of types $\theta_j \sim H(\cdot)$ on compact support. Each type has a base profit function $\pi(a; \theta)$ maximized at $a = \theta$, and we define $\pi^*(\theta) \equiv \max_a \pi(a; \theta) = \pi(\theta, \theta)$. 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 V, 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 $f(0)\tilde{\pi}(0) < K$ or $f(1)\tilde{\pi}(1) > K$, 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

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. This is the case when the type is (θ_i, ϵ_i) with a base profit $\epsilon_i + \max_a \pi(a; \theta_i)$, as in the first extension in Section V.B. It is also the case when the type is $\theta_j = (\theta_{ij})$, with a base profit $\sum_i \pi(\theta_{ij}; \theta_{ij}) \nu_i$.

A.2. Extensions of the Model with Broker-Dealers

We consider three extensions of the baseline model in Section V.B. The final one considers the case where broker-dealer firms are indexed by an observable characteristic, and the level of the fixed cost change depends on this characteristic. In this final modification, a weaker but still empirically falsifiable result holds.

Idiosyncratic Entry Costs. Suppose that each potential entrant is now categorized by an ordered pair (θ_j, ϵ_j) , where $\epsilon_j \sim G(\cdot|\theta_j)$. A firm of type (θ_j, ϵ_j) has a base profit function $\pi(a; \theta_j) + \epsilon_j$. This extension allows firms who would offer the same profit conditional on entry to be differentially profitable. As before, let $\mathcal{E}^*(K)$ denote the set of types who would enter with a fixed cost of K . Appendix A shows, using an argument analogous to the one used to derive (3), that if $K' \geq K$ then $\mathcal{E}^*(K') \subseteq \mathcal{E}^*(K)$. Then, if we define

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

and $\bar{\theta}(K)$ analogous with the min replaced by the max, we would again have $\underline{\theta}(K) \leq \underline{\theta}(K')$ and $\bar{\theta}(K) \geq \bar{\theta}(K')$. 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.

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 θ_j such that the profit of offering a consumer of type i advice a is $\pi(a; \theta_{ij})$, maximized at $a = \theta_{ij}$. 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 θ_j firm if μ people enter is

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

Again, one can show that $\mathcal{E}^*(K') \subseteq \mathcal{E}^*(K)$. Denote

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

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.

Multiple Broker-Dealer Types. 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. That is, suppose the "type" of a broker-dealer is (θ, m) where

$m \in \{1, 2, \dots, M\}$. A (θ, m) broker-dealer has a base profit function $\pi_m(a; \theta)$ maximized at $a = \theta$, and the total profit is $f_m(\boldsymbol{\mu}) \cdot \pi_m(a; \theta)$, where $f_m(\boldsymbol{\mu})$ is a function of the mass of each type of entrant. Importantly, the fixed cost of entry is K_m for type (θ, m) , and fiduciary duty that operates through a pure fixed cost channel will increase it to $K'_m \geq K_m$. In the local-national example, we might imagine that $K'_{\text{local}} - K_{\text{local}} > K'_{\text{national}} - K_{\text{national}}$.

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 Type 2 firms is strictly to the right of the support of that provided by Type 1—in the absence of fiduciary duty. Under reasonable conditions on $f(\cdot)$ (such as the ones in Appendix A.3), fiduciary duty will lead to a decrease in the number of Type 1 firms in the market and an increase in the Type 2 firms. Then, the advice under fiduciary duty will not be a subset of that without.⁵⁵ By itself, this possibility poses a difficulty for the testable restrictions discussed in Section V.E, 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 Type 2 broker-dealers. Indeed, this is a general requirement for us to see an expansion of advice upon imposing of fiduciary duty, in a pure fixed cost channel.

Let μ_m denote the equilibrium mass of type- m firms in a world without fiduciary duty, and let μ'_m denote this mass in a world with fiduciary duty operating through a pure fixed cost channel (even with potentially heterogeneous effects on entry costs). Suppose $\mu'_m < \mu_m$. Then, (θ, m) enters with fiduciary duty if $f_m(\boldsymbol{\mu}') \cdot \pi_m^*(\theta) \geq K'$, or $\pi_m^*(\theta) \geq K'/f_m(\boldsymbol{\mu}')$. Similarly, (θ, m) enters without fiduciary duty if $\pi_m^*(\theta) \geq K/f_m(\boldsymbol{\mu})$. Since $\mu'_m < \mu_m$, it must be that $K'/f_m(\boldsymbol{\mu}') > K/f_m(\boldsymbol{\mu})$, meaning if (θ, m) enters with fiduciary duty, it must enter without fiduciary duty as well. Under a pure fixed cost channel, if the mass of a particular subset of broker-dealers decreases, then the set of advice offered by that broker-dealer must shrink. If the mass of *all* M subsets of broker-dealers decreases, then the set of advice offered by broker-dealers thus must shrink as well. The key observation is that the relative profitability of types (within m) is not affected by the imposition of fiduciary duty.

This argument provides a caveat to the discussion in Section V.E. 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.

Direct Impact of Competition on Advice. Thus far, we have assume that competition only scales the per-transaction profits when affecting total profits. However, one might imagine that competition has a direct impact on advice provided. To model this phenomenon, we let μ impact the base profit

⁵⁵One can essentially go through Appendix A.3 and label the broker-dealers as “local broker-dealers” and the investment advisers as “national broker-dealers.”

function directly. That is, we say that

$$\pi(a; \theta, \mu) = \pi(a - g_\theta(\mu); \theta) - k_\theta(\mu), \quad (\text{A.1})$$

for some functions $g_\theta(\cdot)$ and $k_\theta(\cdot)$.

First begin the analysis with the restriction $k_\theta(\mu) = 0$. In this situation, competition affects the optimal advice, so that a type θ firm offers advice $\theta + g_\theta(\mu)$ where there is a mass μ in the market. However, this firm still makes base profits $\pi^*(\theta)$. Thus, the ordering of firms' profits does not change, and as K increases to K' , the set of firms who enters becomes a subset of the initial set of firms.

How would the presence of $g_\theta(\mu)$ affect observed advice? If an increase from K to K' decreases μ , then the type that offers the best advice in the market would get weakly worse. However, it may be that $g_\theta(\mu)$ can compensate this reduction in the quality of the type. That is, *if* $g_\theta(\mu)$ is increasing in μ , then it might be the case that we would see an improvement in the best advice even in a pure fixed cost channel, since the competitive effect on advice would counteract the contraction in types. However, it is easy to see that if $g_\theta(\mu)$ is decreasing in μ —increased competition weakly improves advice for all types, even if it is heterogeneous by type—we would still be unable to see an improvement in the best advice in a pure fixed cost channel. The quality of the best type who enters would weakly worsen as K increases, and this type would then offer weakly worse advice.

It is easy to see that the analysis does not change if $k_\theta(\mu) = k(\mu)$ for all θ . If competition has the same effect on per-transaction profits on all types, then the ordering of profits across types does not change. Then, as long as the set of firms decreases upon imposition of fiduciary duty, the same predictions as above go through in a pure fixed cost channel.

However, if $k_\theta(\mu)$ differs by θ , these predictions need not hold. A sufficient condition for them to hold is that the ordering of types does not change as μ changes, and a sufficient condition for this is that

$$\max_a \{\pi(a - g_\theta(\mu); \theta) - k_\theta(\mu)\} \geq \max_a \{\pi(a - g_{\theta'}(\mu); \theta') - k_{\theta'}(\mu)\}$$

for some set (θ, θ', μ) means that it must hold true for all μ (and that pair (θ, θ')). Note that we can write $\max_a \pi(a - g_\theta(\mu); \theta)$ as $\pi^*(\theta)$. Then, it must be that

$$\pi^*(\theta) - k_\theta(\mu) \geq \pi^*(\theta') - k_{\theta'}(\mu)$$

for all μ . Rearranging, we have

$$\pi^*(\theta) - \pi^*(\theta') \geq k_\theta(\mu) - k_{\theta'}(\mu) \quad \forall \mu,$$

so we must have

$$\pi^*(\theta) - \pi^*(\theta') \geq \max_\mu [k_\theta(\mu) - k_{\theta'}(\mu)]. \quad (\text{A.2})$$

While it is possible to find strong conditions on π^* and $k_\theta(\cdot)$ to let this hold (e.g., $\pi^*(\theta)$ is increasing

in θ and $k_\theta(\mu)$ is decreasing in θ for all μ), we have been unable to find more general primitive conditions under which (A.2) holds. Heuristically, however, the conclusion of this section is that if (i) competition improves the optimal advice and (ii) the impact on competition does not vary “much” with the type of the firm, then the best advice cannot improve if fiduciary duty operates through a pure fixed cost channel.⁵⁶

A.3. Adding Registered Investment Advisers

Now suppose that in addition to broker-dealers, there are registered investment advisers in the market as well. 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 θ_j . A firm who enters will earn profits (net of entry costs) equal to

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

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

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

for $T \in \{BD, IA\}$, where $\mathcal{E}_T(\mu_{BD}, \mu_{IA}, K_T)$ 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 .⁵⁷ As 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 equilibrium consists of $(\mu_{BD}^*(K_{BD}, K_{IA}), \mu_{IA}^*(K_{BD}, K_{IA}))$ such that

$$\begin{aligned} \hat{\pi}_{BD}(\mu_{BD}^*, \mu_{IA}^*) &\equiv f_{BD}(\mu_{BD}^*, \mu_{IA}^*) \cdot \tilde{\pi}_{BD}(\mu_{BD}^*) = K_{BD} \\ \hat{\pi}_{IA}(\mu_{BD}^*, \mu_{IA}^*) &\equiv f_{IA}(\mu_{BD}^*, \mu_{IA}^*) \cdot \tilde{\pi}_{IA}(\mu_{IA}^*) = K_{IA}, \end{aligned} \tag{A.3}$$

where $f_T(\cdot; \cdot)$ 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 the assumption that cross-price competitive effects are not too strong.

⁵⁶To reiterate, this statement is formal if we drop “much” from it.

⁵⁷The 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.

Assumption 1. *Assume*

$$\frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} > \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \cdot \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}}. \quad (\text{A.4})$$

The left-hand side of (A.4) 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*

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

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

Proof. Direct computations show that the left-hand side of (A.4) is

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

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. \square

Similar calculations show that a sufficient condition for Assumption 1 under more general f involves replacing $\hat{\pi}_T$ by f_T in (A.4). 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.3); (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.3) 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.3) with respect to K_{BD} . Then,

$$\begin{pmatrix} \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} & \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \\ \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}} & \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} \end{pmatrix} \begin{pmatrix} \frac{d\mu_{BD}}{dK_{BD}} \\ \frac{d\mu_{IA}}{dK_{BD}} \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}. \quad (\text{A.5})$$

Solving (A.5) for the derivatives gives

$$\begin{pmatrix} \frac{d\mu_{BD}}{dK_{BD}} \\ \frac{d\mu_{IA}}{dK_{BD}} \end{pmatrix} = \begin{pmatrix} \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} & \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} \\ \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} & \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}} \end{pmatrix}^{-1} \begin{pmatrix} \frac{\partial \hat{\pi}_{IA}}{\partial \mu_{IA}} & -\frac{\partial \hat{\pi}_{BD}}{\partial \mu_{IA}} \\ -\frac{\partial \hat{\pi}_{IA}}{\partial \mu_{BD}} & \frac{\partial \hat{\pi}_{BD}}{\partial \mu_{BD}} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}. \quad (\text{A.6})$$

Assumption 1 ensures the first term in (A.6) is positive. The elements of the first column are negative and positive, respectively, which completes the argument. \square

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

$$\mathcal{E}_{BD}^*(K'_{BD}, K_{IA}) \subseteq \mathcal{E}_{BD}^*(K_{BD}, K_{IA}) \text{ and } \mathcal{E}_{IA}^*(K_{BD}, K_{IA}) \subseteq \mathcal{E}_{IA}^*(K'_{BD}, K_{IA}). \quad (\text{A.7})$$

The result in (A.7) 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. The second reason this is important is that 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 V.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

B.1. Summary Statistics and Covariate Balance

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 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 5.2 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 75% of the time, while the proportion is

Table B.1: Summary statistics for all counties

| | <i>N</i> | Mean | Std.Dev. | Percentiles | | | | |
|----------------------------------|----------|-------|----------|-------------|------|-------|-------|-------|
| | | | | 10% | 25% | 50% | 75% | 90% |
| <i>Advisor-Level Quantities</i> | | | | | | | | |
| Is Broker-Dealer | | | | | | | | |
| FSP Advisors | 39,882 | 0.184 | | | | | | |
| Contracts per FSP Advisor | | | | | | | | |
| BD | 7,338 | 5.2 | 8.7 | 1 | 1 | 2 | 6 | 12 |
| RIA | 32,544 | 5.5 | 8.5 | 1 | 1 | 3 | 6 | 13 |
| <i>Contract-Level Quantities</i> | | | | | | | | |
| Is Variable Annuity | | | | | | | | |
| BD | 38,435 | 0.770 | | | | | | |
| RIA | 177,532 | 0.901 | | | | | | |
| Contract Amounts (\$K, 2015) | | | | | | | | |
| BD | 38,435 | 119.2 | 147.1 | 23.4 | 40.3 | 77.8 | 144.6 | 253.0 |
| RIA | 177,532 | 157.9 | 197.9 | 34.4 | 56.2 | 101.4 | 197.8 | 314.9 |
| Client Age | | | | | | | | |
| BD | 38,435 | 61.8 | 10.5 | 49 | 56 | 62 | 68 | 75 |
| RIA | 177,532 | 64.7 | 9.9 | 54 | 59 | 65 | 71 | 77 |

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 I and B.1 suggests that imposing the restriction to the border limits us to about 10% of the sample in terms of advisers and about 11% in terms of contracts. However, somewhat surprisingly, the characteristics of financial advisers 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 do 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.

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 run regressions at the

Table B.2: Covariate balance

| | Transactions | | | Discovery | | |
|-------------------------------|---------------------|--------------------|-------------|---------------------|-------------------|-------------|
| | No Border FE (1) | Border FE (2) | Mean (3) | No Border FE (4) | Border FE (5) | Mean (6) |
| Population (K) | 168.36 (229.25) | -104.71 (96.95) | 132.84 | 35.66 (42.48) | 28.46 (26.25) | 102.55 |
| Median Age | -0.33 (0.80) | 0.29 (0.45) | 40.66 | -0.57 (0.87) | -0.60 (0.43) | 41.37 |
| Pop Black (K) | 27.31 (38.03) | -17.27 (25.09) | 16.13 | 7.72 (5.04) | 7.13** (2.92) | 12.57 |
| Pop Hispanic (K) | 130.00 (96.85) | 0.14 (20.04) | 21.72 | 15.85 (14.57) | 12.83 (9.84) | 16.48 |
| Median HH Income (K) | 0.12 (6.10) | 0.74 (1.96) | 45.60 | 1.99 (2.61) | 1.23* (0.68) | 44.45 |
| Mean HH Income (K) | -1.27 (7.64) | -0.93 (2.87) | 59.82 | 2.26 (3.04) | 1.28 (0.86) | 58.38 |
| Pct. Unemployment | 0.60 (0.81) | -0.56*** (0.20) | 9.35 | -0.16 (1.06) | -0.08 (0.31) | 9.30 |
| Pct. Poverty | -0.19 (1.81) | -1.02 (0.70) | 17.46 | -0.68 (1.67) | -0.36 (0.50) | 17.72 |
| Pct. HH with less than \$25k | -0.92 (2.09) | -1.21 (1.10) | 28.48 | -0.99 (1.96) | -0.52 (0.52) | 29.14 |
| Pct. HH with less than \$50k | -0.98 (4.10) | -1.35 (1.48) | 54.98 | -1.82 (2.40) | -1.10* (0.64) | 56.11 |
| Pct. HH with less than \$75k | -0.33 (4.66) | -0.59 (1.47) | 73.23 | -1.52 (2.09) | -0.77 (0.61) | 74.31 |
| Pct. HH with less than \$100k | 0.25 (4.25) | -0.00 (1.33) | 84.53 | -1.26 (1.56) | -0.68 (0.48) | 85.45 |
| Pct. Pop less than HS | 1.52 (1.45) | -0.44 (0.62) | 14.58 | -0.03 (1.61) | 0.36 (0.39) | 14.97 |
| Pct. Pop HS | 2.31** (0.87) | 1.81** (0.87) | 32.88 | 1.66 (1.39) | 1.73*** (0.52) | 33.68 |
| Pct. Pop BA or Higher | -4.15 (3.07) | -1.98 (1.42) | 19.66 | -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 border level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

county level of the demographic quantity on a dummy for whether the county has fiduciary duty. We run 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.2 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.2 is that on almost all covariates, we estimate fairly tight

Table B.3: Client covariates

| | Age of Contract Holder | | Cross-Border Shopper | | Trans. Amount (\$K) | |
|------------------|------------------------|-------------------|----------------------|------------------|---------------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| DID | -0.174 (0.834) | 0.744 (0.524) | -0.013 (0.028) | 0.002 (0.029) | 4.85 (15.92) | 8.76 (9.706) |
| FD on BD | -0.239 (0.757) | 0.532 (0.507) | 0.006 (0.034) | 0.021 (0.035) | 1.87 (14.74) | 4.52 (9.28) |
| FD on RIA | -0.065 (0.298) | -0.212 (0.163) | 0.019 (0.025) | 0.019 (0.017) | -2.98 (5.36) | -4.24 (3.32) |
| Border FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | No | Yes | No | Yes | No | Yes |
| Mean of Dep. Var | 64.0 | 64.0 | 0.320 | 0.320 | 146.1 | 146.1 |
| N | 22,803 | 22,781 | 22,803 | 22,781 | 22,803 | 22,781 |

Contract-level regression using Specification (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, and Columns (2), (4), and (6) also include firm fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

zeros on the difference between means for counties with and without fiduciary duty.

Table B.3 shows evidence that there is no differential selection at the border into 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 run the same regression as in Specification (1) with these as the left-hand side variables. We find no evidence that there is differential selection by age induced by fiduciary 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) 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 be concerned that advisers influence the transaction amount, and fiduciary duty might affect how much they try to do so.

Table B.4: Further robustness checks on purchase of variable vs. fixed indexed annuity

| | Including NY (1) | Excluding Mecklenburg (2) | FSP Only Advisers (3) |
|-----------------|----------------------|------------------------------|--------------------------|
| DID | -0.144*** (0.025) | -0.101** (0.041) | -0.048 (0.053) |
| FD on BD | -0.160*** (0.026) | -0.069** (0.031) | -0.070* (0.037) |
| FD on DR | -0.016 (0.023) | 0.032 (0.028) | -0.022 (0.024) |
| Base Group Mean | 0.887 | 0.871 | 0.764 |
| <i>N</i> | 35,661 | 21,351 | 5,995 |

Main specification, with a dummy for whether the contract is a variable annuity on the left-hand side, on different samples. Column (1) includes New York (using the classification of it as a state without heightened duty, as per Finke and Langdon (2012)). Column (2) excludes Mecklenburg County, NC, which contains Charlotte. Column (3) restricts to advisers who are flagged as only carrying FSP products. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

B.2. Further Robustness Checks

In this appendix, we present three further robustness checks on the result that fiduciary duty affects the composition of products sold. The results are presented in Table B.4.

In the baseline dataset in the body of the paper, we have excluded contracts sold in the state of New York. New York has a complex system of financial regulations that, to our knowledge, differs significantly from that of other states. Indeed, it has a different suite of annuities as well: every type of annuity in our dataset has a New York-specific version that differs on some dimensions. Thus, we are hesitant to compare across borders with New York, even using RIAs as a control. Nevertheless, Column (1) of Table B.4 adds these contracts back into the dataset, along with relevant borders. We use the classification from Finke and Langdon (2012) that New York common law does not impose heightened fiduciary duty on its advisers. We see that including these advisers strengthens the result significantly, and we still do not see a significant difference between RIAs on each side of the border. This is despite the fact that the sample size increases considerably given the large number of contracts in this border.

The borders studied in the baseline specification mostly do not include large metropolitan areas. The key exception is that the North Carolina/South Carolina border encompasses Mecklenburg County, where Charlotte, NC is located. Given that Charlotte is a large city and a finance hub, one may wonder whether advisers are different in this city. Column (2) runs the regression excluding all advisers in Mecklenburg County and obtains similar results to the baseline.

Finally, advisers in our sample can carry financial products from not just FSP but also other financial service providers. Given that we do not observe sales of non-FSP products, a concern may be that fiduciary duty induces advisers to shift to products from other providers, and that

this selection is differential by type of annuity. That is, imposing fiduciary duty causes a shift away from FSP variable annuities to other variable annuities. We find this to be unlikely a priori, since FSP is representative of the market in terms of financial health and product rates. However, we can partially address this concern by using information in Discovery about the advisers’ carrier affiliations. Given we observe which financial service providers’ products each adviser carries, we can restrict to advisers who are marked to only carry FSP products. Column (3) shows that the difference for broker-dealers is noisier than the baseline but around the same magnitude. The difference-in-difference coefficient has the same sign but is about half the magnitude of the baseline, although the difference seems to come mostly from the noisy effect on RIAs. While the result is still broadly consistent with the baseline, we should note that restricting to advisers that only sell FSP products does lead to an especially selected sample. Advisers and clients in this sample may well be different than the baseline sample, and we should expect changes in the estimated treatment effect.

B.3. Entry Probabilities

We now wish to compute the effect of fiduciary duty on the probability of entry into a market. To do so, we need to take a stance on which firms are potential entrants in a market. While there is no precedent in the entry literature on understanding potential entrants for financial advice, we follow the parallel that firms in “nearby” markets are potential entrants. Based on the intuition that it may be difficult to open locations far away from existing ones and also difficult to open locations in different states, we assume that a firm is a potential entrant in county c if (i) it has entered a county within 50 miles of c or (ii) it is a non-local firm which has entered some other county in the same state as c . We run a sensitivity check in which we allow national firms to be potential entrants in every county in the United States.⁵⁸ Given a definition of potential entrants, we then run a linear probability model of a dummy for whether firm f enters county c , where an observation exists in the dataset if f is a potential entrant in c . The covariates include whether firm is a broker-dealer firm, the fiduciary status of the county, and the interaction of the two so that this regression has an interpretation as a difference-in-differences for the probability of entry. We control for border fixed effects; fixed effects for the firm footprint; and the population, median household income, and median age of the county. We also include a specification in which we include a triple interaction of the fiduciary dummy, the broker-dealer dummy, and dummies for firm footprint. We use two-way clustering at the firm and border levels to compute standard errors.

Table B.5 reports the results of these regressions. Columns (1) and (2) use the assumption that national firms are only potential entrants in states in which they have entered. We estimate a point estimate of -0.2 pp on the fiduciary dummy, which corresponds to the difference in entry probabilities for RIA firms in counties with and without fiduciary duty. Broker-dealers have similar probabilities of entry as RIAs (point estimate of 0.07 pp). In contrast, the coefficient on the interaction of these dummies is an economically and statistically significant 1.2 pp, off a mean of 7.4 pp, suggesting

⁵⁸We have also run other sensitivity checks, e.g., in which we constrain multistate firms to only enter counties that are within 50 miles, and results are similar. We omit these checks from the paper.

Table B.5: Entry probabilities

| | Nationals Enter in State | | Nationals Enter Everywhere | |
|---|--------------------------|----------------------|----------------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| $\mathbb{1}[\text{Fiduciary}]$ | -0.00192 (0.00652) | -0.00298 (0.0515) | -0.00247 (0.00545) | -0.00561 (0.0511) |
| $\mathbb{1}[\text{BD}]$ | 0.000645 (0.00947) | 0.0824 (0.0992) | -0.00487 (0.00943) | 0.0811 (0.0977) |
| $\mathbb{1}[\text{Fiduciary}] \times \mathbb{1}[\text{BD}]$ | -0.0122* (0.00657) | -0.0676 (0.102) | -0.00979* (0.00561) | -0.0659 (0.102) |
| Multistate | -0.0138 (0.0450) | 0.0246 (0.0378) | -0.0202 (0.0443) | 0.0169 (0.0367) |
| Regional | 0.00735 (0.0457) | 0.0490 (0.0397) | 0.000777 (0.0450) | 0.0409 (0.0385) |
| National | 0.0637 (0.0487) | 0.0920** (0.0453) | 0.0367 (0.0474) | 0.0693 (0.0435) |
| $\mathbb{1}[\text{Fiduciary}] \times \mathbb{1}[\text{BD}]$ × Multistate | | 0.0569 (0.103) | | 0.0564 (0.102) |
| $\mathbb{1}[\text{Fiduciary}] \times \mathbb{1}[\text{BD}]$ × Regional | | 0.0586 (0.101) | | 0.0573 (0.100) |
| $\mathbb{1}[\text{Fiduciary}] \times \mathbb{1}[\text{BD}]$ × National | | 0.0626 (0.102) | | 0.0608 (0.101) |
| N | 61,413 | 61,413 | 72,125 | 72,125 |
| Probability of Entry | 0.0735 | 0.0735 | 0.0626 | 0.0626 |

Regressions of whether a firm entered in a county in which it is a potential entrant on fiduciary status, broker-dealer status, and the interaction. All specifications include fixed effects for the footprint (with local excluded); controls for log population, log median household income, and median age; and border fixed effects. Columns (2) and (4) include a full interaction between fiduciary status, broker-dealer, and footprint, although not all coefficients are shown. Columns (3) and (4) assume national firms are potential entrants in all counties. Standard errors are computed using two-way clustering at the border and the firm levels. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

that fiduciary duty does have a significant impact on the probability of broker-dealer entry. The dummies for firm footprint indicate that firms with larger footprints do in fact have a higher entry probability, even controlling for the mechanical effect that they are potential entrants in a larger set of counties. Column (2) adds the triple interaction of fiduciary duty and broker-dealer with firm footprint. Of interest is that while the coefficient for fiduciary status for local firms is a large and negative (this is the coefficient on the interaction of fiduciary status with broker-dealer status), albeit rather noisy, decrease of 6.8 pp, the result for larger firms moves the total effect towards zero. Indeed, adding the coefficients in the final panel of the table with the point estimate of -6.8 pp yields point estimates that are negative but close to 0. These results are thus in line with the shift away from local broker-dealers documented in Table VI for counties with fiduciary duty, although the effects disaggregated by footprint are especially noisy. Columns (3) and (4) use the alternate assumption on potential entrants, and coefficients are largely similar.

B.4. A Model-Based Validation of the Homogeneity Across the Border

A natural concern is that the two markets we use may have unobserved differences in latent demand for financial products. While we do not believe this to be the case in our setting, as we discuss in Section II, it is still informative to discuss whether the model allows for a way to test this identifying assumption through the model. Of course to have any hope of either testing or controlling for cross-market differences, we must put some structure on how the two markets compare to each other. In this section, we impose the (admittedly strong) assumption that the two markets are different in that optimal advice is shifted everywhere by a constant term Δ . Letting Market A denote the market with fiduciary duty, and Market B the market without,

$$\pi_T^B(a; \theta_j) = \pi_T^A(a + \Delta; \theta_j)$$

for both T and all θ_j . If Markets A and B are truly identical then we would expect $\Delta = 0$. Here, we first provide two methods to test this assertion. Second, we formalize the statements made in the body of the paper that the difference-in-differences estimator would estimate the impact of fiduciary duty in the absence of spillovers, even with demand breaks.

The first method to test $\Delta = 0$ is at the firm level. Since fiduciary duty does not directly impact the RIA market except through entry, conditional on a RIA firm entering into both Markets A and B, the shift in its advice should be zero. Thus, within-RIA-firm comparisons should give an estimate of Δ . Column (2) of Table II and Columns (2) and (4) of Table VII show that the within-firm change in the products sold by RIAs—either in terms of class of product or in terms of returns—is usually smaller than the change for broker-dealers or simply small in magnitude. Table B.6 shows that for almost all the other outcomes considered in the analysis, the RIA difference is close to zero with firm fixed effects.

The second method is at the market level. Let \underline{a}_M and \bar{a}_M be the lowest and highest values of advice observed in market $M \in \{A, B\}$; let $\underline{\theta}_M$ and $\bar{\theta}_M$ be the lowest and highest types in the

market. Normalize the profit functions so that $a^*(\theta) = \theta$ in Market A. Then, we know that $\underline{a}_A = \underline{\theta}_A$ and $\bar{a}_A = \bar{\theta}_A$, and $\underline{a}_B = \underline{\theta}_B - \Delta$ and $\bar{a}_B = \bar{\theta}_B - \Delta$. However, we know from (A.7) that $\underline{\theta}_A \geq \underline{\theta}_B$ and $\bar{\theta}_A \leq \bar{\theta}_B$. Substituting, we get the bounds

$$\bar{a}_A - \bar{a}_B \leq \Delta \leq \underline{a}_A - \underline{a}_B. \quad (\text{B.1})$$

For some intuition on (B.1), note that entry of RIA firms would force the set of *types* of entrants to expand. Advice maps to types by a shift of Δ , so Δ must be such that the set of types implied by observed advice and Δ is such that this expansion is respected. Accordingly, if the extremes of advice for dually-registered advisers do not change much, then Δ could not have been especially large.

One could imagine implementing this test in our setting by comparing extreme quantiles of the distribution of advice for RIAs. These numbers are presented in Table IX. Taking the 10th and 90th percentiles as the extremes, we would estimate that $|\Delta| < 0.0019$, and using the 5th and 95th percentiles, we would estimate $|\Delta| < 0.0012$. While these numbers are not trivial, they are still smaller than the estimate of 0.0036 in Table V of the change in returns for broker-dealers due to fiduciary duty.⁵⁹

How can we interpret the difference-in-differences estimator through the lens of the mode? First note that this model can also formalize the statement that under the null that fiduciary duty has no effect (the change in K is 0 and there is no additional cost that depends on advice given), the difference-in-differences in the mean is zero even if $\Delta \neq 0$. To see this, simply note that if fiduciary duty has no effect, then the same set of entrants—both broker-dealers and registered investment advisers—enters in Markets A and B. However, in Market B, advice for each firm is shifted to the right by Δ . Thus, the difference in mean advice provided by entrants, for both groups, is Δ . This means the difference-in-differences is 0. More generally, if the only effect on RIAs is that the demand break induces them to change their advice by Δ (“no spillovers”), then the RIA difference is Δ . All BDs would shift their advice by Δ in addition to any net effect due to entry and recomposition. Thus, the difference-in-difference estimator would subtract off Δ and provide an estimate of the effect of fiduciary duty on BDs.

B.5. Outcomes with Firm Fixed Effects

Table B.6 presents regressions of the form 1, restricting to border counties, but adding firm fixed effects. We report these regressions for all outcomes presented in Section IV. The takeaway from this analysis is that even with firm fixed effects, the differences (and the difference-in-difference) are dampened somewhat but still survive. This suggests that fiduciary duty affects choice even

⁵⁹Moreover, note that these bounds are actually from an implication of (B.1) that

$$|\Delta| \leq \max \{ |\underline{a}_A - \underline{a}_B|, |\bar{a}_A - \bar{a}_B| \}.$$

Given that the point estimates essentially estimate an improvement in low returns and a reduction in high returns for RIAs, the bounds in (B.1) are inconsistent. Of course, although almost all estimates are statistically indistinguishable from zero.

within-firm. In fact, the magnitude of the difference in broker-dealer outcomes is usually comparable to that without firm fixed effects—with the main exception being the regression of the dummy of whether the product is a variable annuity.⁶⁰

Moreover, we find consistently that the RIA difference is closer to zero than without firm fixed-effects. Appendix B.4 argues that even with spillovers onto RIAs through entry, the effect on RIAs with firm fixed effects can be an estimate of Δ . Thus, this provides further evidence that $\Delta \approx 0$.

C. Computation of the Investment Possibility Frontier

In this appendix, we detail how we compute investment returns and optimal portfolio allocations when computing (i) maximum returns in Section IV.C and (ii) net present values as discussed in Appendix D.

C.1. Computing Returns

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 monthly 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: reinvested dividends accrue to the firm. Since mutual funds are opened over different time spans, historical returns may not be comparable across funds. We thus use a CAPM-style method to impute historical returns. For each fund f , we run a regression of the form

$$r_{fm} = \alpha_f + \beta_f \cdot r_m^{\text{S\&P}} + \epsilon_{fm}, \quad (\text{C.1})$$

where $r_m^{\text{S\&P}}$ is the return of the S&P index over the same month, and ϵ_{fm} is the abnormal return. We then say that the expected return for fund f is $e_f \equiv \hat{\alpha}_f + \hat{\beta}_f \cdot e^{\text{S\&P}}$, where $e^{\text{S\&P}}$ is the mean monthly return of the S&P index since 1990. The covariance of funds f and f' is then

$$\beta_f \cdot \beta_{f'} \cdot \text{var}(\text{S\&P}) + \text{cov}(\hat{\epsilon}_{fm}, \hat{\epsilon}_{f'm}), \quad (\text{C.2})$$

where the first term is the empirical variance of the monthly S&P returns and the second term is the empirical covariance of the abnormal returns over the months in which they overlap.

Consider the set of investment options for a variable annuity, and denote by \hat{V} the variance-covariance matrix as computed by (C.1) and (C.2). Since the covariance of the abnormal returns is computed over different time periods, \hat{V} need not be positive semidefinite in finite samples (although it often is). Thus, to convert it to a valid covariance matrix, we find the closest positive semidefinite

⁶⁰Even in this case, the effect has the same sign, even if it is considerably noisier and drops in magnitude by about 75%.

Table B.6: Summary of outcomes, with firm fixed effects

| | # Funds | | # Equity Styles | | | # FI Styles | | | Return | |
|--------------------|---------------------|----------------------|----------------------|----------------------|--------------------------|---------------------|----------------------|---------------------|--------------------|--|
| | All (1) | $\geq 4\star$ (2) | $\leq 2\star$ (3) | High Qual (4) | Only Low Qual (5) | High Qual (6) | Only Low Qual (7) | Optimal (8) | Equal (9) | |
| FD on BD | 6.82** (3.25) | 2.14* (1.26) | 2.62* (1.33) | 0.367* (0.205) | -0.332* (0.193) | -0.010 (0.060) | -0.067*** (0.018) | 0.0029 (0.0028) | 0.0004 (0.0004) | |
| FD on RIA | 1.03 (1.63) | -0.32 (0.41) | 0.85 (0.93) | -0.028 (0.083) | -0.008 (0.100) | -0.059 (0.054) | -0.001 (0.009) | -0.0011 (0.0013) | 0.0003 (0.0002) | |
| DID | 5.79 (3.46) | 2.46* (1.35) | 1.77 (1.43) | 0.395* (0.224) | -0.324 (0.214) | 0.049 (0.090) | -0.065*** (0.017) | 0.0040 (0.0032) | 0.0006 (0.0005) | |
| Base Mean | 96.82 | 32.04 | 31.35 | 7.214 | 0.865 | 4.407 | 3.027 | 0.080 | 0.025 | |
| N | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 19,808 | 15,785 | 15,785 | |
| Subaccount Expense | | | | | | | | | | |
| | M&E (10) | Minimum (11) | Average (12) | Surr. Charge (13) | $\mathbb{1}[VA]$ (14) | Optimal (15) | Equal (16) | | | |
| FD on BD | -0.014* (0.008) | -0.004* (0.002) | 0.044** (0.018) | -0.070 (0.130) | -0.025 (0.033) | 0.0036 (0.0026) | 0.0011 (0.0008) | | | |
| FD on RIA | 0.007 (0.008) | -0.000 (0.001) | 0.002 (0.009) | -0.054 (0.055) | 0.018 (0.012) | -0.0009 (0.0010) | 0.0006 (0.0004) | | | |
| DID | -0.021** (0.010) | -0.004 (0.003) | 0.042** (0.019) | -0.016 (0.167) | -0.043 (0.031) | 0.0046* (0.0026) | (0.0005) (0.0008) | | | |
| Base Mean | 1.088 | 0.501 | 1.263 | 3.106 | 0.869 | 0.090 | 0.063 | | | |
| N | 19,808 | 19,808 | 19,808 | 19,808 | 22,781 | 15,768 | 15,768 | | | |

Summary of all outcomes investigated in the paper, with firm fixed effects. Contracts are restricted to borders, specifications include border fixed effects, and standard errors are clustered at the state. All estimates use a sample of variable annuities except (14), which uses the sample of all annuities. Columns (8), (9), (15) and (16) use the sample of variable annuities where rider choice could be determined unambiguously from the data. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

matrix to it. 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.⁶¹

We compared the investment frontiers generated through this method with ones generated using “excess returns” that impose $\beta_f \equiv 1$. We find them to be very similar. Using just the returns over the period over which the fund was active tends to give higher returns, as some funds were not available during the financial crisis.

C.2. Optimal Portfolio Allocation

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 $Ms \geq m$. If r is the vector of estimated returns, the maximum possible return is simply the linear program

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

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

Maximizing the net present value might not correspond to maximizing the mean return. However, the optimal allocation must necessarily lie on an extended version of the efficient frontier. We can solve for the typical variance-minimizing portfolios as

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

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. However, given the convexity of the contracts, a risk-neutral individual may also want *higher* risk, so we also solve the version of (C.4) 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.

D. Computations of Net Present Values

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 without a living benefit rider.

⁶¹We 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.

D.1. Definitions and Contract Rules

When a variable 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 . 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. 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 $t + 1$.

Variable annuity contracts 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, a variable fee v^c on the contract value, and a variable fee on the income base v^b . In what follows, 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.

Variable annuity contracts with a minimum withdrawal living benefit rider have two additional features that affect transitions of the income base and of the contract value. 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, $g_t \in \{g_1, \dots, g_G\}$. 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 and 5%, respectively.

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

$$\tilde{c}_t = c_t - (w_t g_t + v^b) b_t - f_t \cdot 1[c_t < \bar{f}] \quad (\text{D.1})$$

$$c_{t+1} = \max[(1 + r_{t+1}(i_t) - v^c(i_t))\tilde{c}_t, 0] \quad (\text{D.2})$$

$$b_{t+1} = \begin{cases} \min[\max[(1 + e_t)b_t, \tilde{c}_t], \bar{b}] & \text{if } a_t < \bar{a} \\ b_t & \text{if } a_t \geq \bar{a} \end{cases} \quad (\text{D.3})$$

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

$$s_0 = 0 \tag{D.4}$$

$$s_{t+1} = s_t \cdot 1 [b_{t+1} \neq \tilde{c}_t \text{ or } w_t = 1] + 1 \tag{D.5}$$

$$e_t = e \cdot 1 [s_t \leq E] \cdot 1 [a_t < \bar{a}]. \tag{D.6}$$

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 $G(a^{first}) : \{a_0, \dots, \bar{a}\} \rightarrow \{g_1, \dots, g_G\}$ 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

$$g_t = \begin{cases} \emptyset & \text{if } a_t < a_0 \\ g_{G(a_t)} & \text{if } a_t \leq a^{first} \\ g_{G(a_{t-1})} & \text{if } a_t > a^{first} \text{ and } \tilde{b}_{t-1} = \tilde{c}_{t-1} \\ g_{t-1} & \text{if } a_t > a^{first} \text{ and } \tilde{b}_{t-1} \neq \tilde{c}_{t-1} \end{cases}. \tag{D.7}$$

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

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

D.2. Solving for the Value of a Variable Annuity Contract 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 . 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

$$V_{T-1}(c_{T-1}, b_{\bar{t}}, g_{\bar{t}}) = \max \left[\left(\max_{(w_{T-1}, i_{T-1})} w_{T-1} \cdot g_{\bar{t}} \cdot b_{\bar{t}} + \delta \cdot \beta \cdot E[c_T] \right), z(a_{T-1}, c_{T-1}), (1 - d_{T-1}) \cdot c_{T-1} \right] \quad (\text{D.8})$$

$$\text{subject to} \quad E[c_T] = E[\max[(1 + r_T(i_{T-1}) - v_T^c) \tilde{c}_{T-1}, 0]] \quad (\text{D.9})$$

$$\tilde{c}_{T-1} = c_{T-1} - (w_{T-1} g_{\bar{t}} + v_{T-1}^b) b_{\bar{t}} - f_{T-1} \cdot 1[c_{T-1} < \bar{f}]. \quad (\text{D.10})$$

In practice, we are setting T equal to 120, and 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, 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

$$V_{T-2}(c_{T-2}, b_{\bar{t}}, g_{\bar{t}}) = \max \left[\begin{aligned} & \max_{(w_{T-2}, i_{T-2})} w_{T-2} \cdot g_{\bar{t}} \cdot b_{\bar{t}} + \delta \left(\mu_{T-1} \cdot E \left[\hat{V}_{T-1}^*(c_{T-1}, b_{\bar{t}}, g_{\bar{t}}) \right] + (1 - \mu_{T-1}) \cdot E[c_{T-1}] \right), \\ & z(a_{T-2}, c_{T-2}), (1 - d_{T-2}) \cdot c_{T-2} \end{aligned} \right], \quad (\text{D.11})$$

$$\text{subject to: } E[c_{T-1}] = E \left[\max \left[(1 + r_{T-1}(i_{T-2}) - v_{T-1}^c) \tilde{c}_{T-2}, 0 \right] \right] \quad (\text{D.12})$$

$$\tilde{c}_{T-2} = c_{T-2} - \left(w_{T-2} g_{\bar{t}} + v_{T-2}^b \right) b_{\bar{t}} - f_{T-2} \cdot 1[c_{T-2} < \bar{f}]. \quad (\text{D.13})$$

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 $\hat{V}_{\bar{t}}^*(c_{\bar{t}}, b_{\bar{t}}, g_{\bar{t}})$.⁶²

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

$$V_{\bar{t}-1}(c_{\bar{t}-1}, b_{\bar{t}-1}, s_{\bar{t}-1}, g_{\bar{t}-1}) = \max \left[\begin{aligned} & \max_{(w_{\bar{t}-1}, i_{\bar{t}-1})} w_{\bar{t}-1} \cdot g_{\bar{t}-1} \cdot b_{\bar{t}-1} \\ & + \delta \cdot \left[\mu_{\bar{t}} \cdot E \left[\hat{V}_{\bar{t}}^*(c_{\bar{t}}, b_{\bar{t}}, g_{\bar{t}}) \right] + (1 - \mu_{\bar{t}}) \cdot \beta \cdot E[c_{\bar{t}}] \right], \\ & z(a_{\bar{t}-1}, c_{\bar{t}-1}), (1 - d_{\bar{t}-1}) \cdot c_{\bar{t}-1} \end{aligned} \right], \quad (\text{D.14})$$

$$\text{subject to: } E[c_{\bar{t}}] = E \left[\max \left[(1 + r_{\bar{t}}(i_{\bar{t}}) - v_{\bar{t}}^c) \tilde{c}_{\bar{t}-1}, 0 \right] \right] \quad (\text{D.15})$$

$$\tilde{c}_{\bar{t}-1} = c_{\bar{t}-1} - \left(w_{\bar{t}-1} g_{\bar{t}-1} + v_{\bar{t}-1}^b \right) b_{\bar{t}-1} - f_{\bar{t}-1} \cdot 1[c_{\bar{t}-1} < \bar{f}] \quad (\text{D.16})$$

$$b_{\bar{t}} = \min \left[\max \left[(1 + e_{\bar{t}-1}) b_{\bar{t}-1}, \tilde{c}_{\bar{t}} \right], \bar{b} \right] \quad (\text{D.17})$$

$$g_{\bar{t}} = \begin{cases} g_{A(a_{\bar{t}-1})} & \text{if } b_{\bar{t}} = \tilde{c}_{\bar{t}-1} \text{ or } a^{first} = a_{\bar{t}} \\ g_{\bar{t}-1} & \text{otherwise} \end{cases}. \quad (\text{D.18})$$

As before, we discretize the space of contract value-income base, 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 $V_{T-2}^*(c^k, b^k, s_{\bar{t}-1}, g_{\bar{t}})$, 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 $V_{T-2}^*(c^k, b^k, 1, g_{\bar{t}}) = V_{T-2}^*(c^k, b^k, y, g_{\bar{t}}) \forall y \in \{2, \dots, E\}$, as the income base is locked in period \bar{t} . Linear interpolation

⁶²Note 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, $V_{\bar{t}}^*(0, b_{\bar{t}}, g_{\bar{t}}) = g_{\bar{t}} \cdot b_{\bar{t}} \cdot \left(1 + \sum_{\tau=\bar{t}+1}^T \delta^{\tau-\bar{t}} \prod_{\tau'=\bar{t}+1}^{\tau} \mu_{\tau'} \right)$.

yields $\hat{V}_{\bar{t}-1}^*(c_{\bar{t}-1}, b_{\bar{t}-1}, s_{\bar{t}-1}, g_{\bar{t}-1})$.

The general recursive formulation for earlier periods is

$$V_t(c_t, b_t, s_t, g_t) = \max \left[\max_{(w_t, i_t)} w_t \cdot g_t \cdot b_t + \delta \cdot \left[\mu_t \cdot E \left[\hat{V}_{t+1}^*(c_{t+1}, b_{t+1}, g_{t+1}) \right] + (1 - \mu_{t+1}) \cdot \beta \cdot E[c_{t+1}] \right], \right. \\ \left. z(a_t, c_t), (1 - d_t) \cdot c_t \right] \quad (\text{D.19})$$

$$\text{subject to: } E[c_{t+1}] = E[\max[(1 + r_{t+1}(i_t) - v_t^c) \tilde{c}_t, 0]] \quad (\text{D.20})$$

$$\tilde{c}_t = c_t - (w_t g_t + v_t^b) b_t - f_t \cdot 1[c_t < \bar{f}] \quad (\text{D.21})$$

$$b_t = \min[\max[(1 + e_t) b_t, \tilde{c}_t], \bar{b}] \quad (\text{D.22})$$

$$g_{\bar{t}} = \begin{cases} g_{A(a_t)} & \text{if } b_t = \tilde{c}_t \text{ or } a^{first} = a_t \\ g_{t-1} & \text{otherwise.} \end{cases} \quad (\text{D.23})$$

Backward induction until the initial period yields the value of the contract, $\hat{V}_0^*(c_0, c_0, E, g_0)$. 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.

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

$$V_{T-1}(c_{T-1}) = \max[\delta \cdot \beta \cdot E[c_T], z(a_{T-1}, c_{T-1}), (1 - d_{T-1}) \cdot c_{T-1}] \quad (\text{D.24})$$

$$\text{subject to: } E[c_T] = E[\max[(1 + r_T(i_{T-1}) - v_T^c) \tilde{c}_{T-1}, 0]] \quad (\text{D.25})$$

$$\tilde{c}_{T-1} = c_{T-1} - f_{T-1} \cdot 1[c_{T-1} < \bar{f}]. \quad (\text{D.26})$$

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 $\hat{V}_{T-1}^*(c_{T-1})$, 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

$$V_t(c_t) = \max \left[\delta \cdot (\mu_{t+1} \cdot E[\hat{V}_{t+1}^*(c_{t+1})] + (1 - \mu_{t+1}) \cdot \beta \cdot E[c_{t+1}]), z(a_t, c_t), (1 - d_t) \cdot c_t \right] \quad (\text{D.27})$$

$$\text{s.t.} \quad E[c_{t+1}] = E[\max[(1 + r_{t+1}(i_t) - v_t^c) \tilde{c}_t, 0]] \quad (\text{D.28})$$

$$\tilde{c}_t = c_t - f_t \cdot 1[c_t < \bar{f}]. \quad (\text{D.29})$$

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

E. Dataset Details

The analysis relies on six main sources of data: Transactions, Discovery, Beacon Annuity Nexus, Morningstar, CRSP, and VA prospectuses. Below, we describe the data in detail, including the collection process and methods used to map across sources.

E.1. 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 annuity (variable, fixed, 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, advisor(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.

E.2. Discovery

The Discovery dataset serves two purposes. First, we rely on it to augment the Transaction dataset with detailed information about advisors. The Discovery dataset contains information on advisors and the firms with which they were employed on December 31, 2015. We observe advisor characteristics, such as an indicator of whether the advisor is a BD or DR, the advisor’s age, gender, and the location of the branch office. We use this branch location to define the advisor’s fiduciary standard. Additionally, the Discovery dataset provides unique identifiers of the advisor’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 advisor ID provided by FSP and restrict to advisors and firms available in Discovery.

We also leverage the Discovery dataset for the market structure analysis. We observe the universe of registered financial advisors who are able to sell annuities as of December 31, 2015. For our main specifications, the outcomes of interest are the aggregate number of advisors 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 advisor coverage across a region, e.g., the Midwest
- National: substantial office and advisor coverage across the U.S.

E.3. 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.

E.4. 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.

E.5. 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.

E.6. 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.3.