THE ROLE OF GOVERNANCE IN RETIREMENT INVESTMENTS: EVIDENCE FROM VARIABLE ANNUITIES

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Abstract

We study the relative importance of market governance and non-market governance in retirement investments using a sample of variable annuities. Variable annuity investors are significantly less sensitive to performance and fees than mutual fund investors. Consistent with a complementary role of market and non-market governance, other governance mechanisms play a stronger role for variable annuity funds. Variable annuity sponsors add alternative investment options and replace advisors on behalf of their investors after poor performance and high fees. These other governance mechanisms are ineffective, however, whenever conflicts of interest exist between variable annuity sponsors and fund advisors.

Introduction

In a seminal article on ownership and control, Fama and Jensen (1983) argue that the role of board governance is different for mutual funds and other financial mutuals than for traditional corporations. When mutual fund investors redeem their shares, they effectively remove the manager from the control of those assets. The decision to withdraw resources and the associated loss of management's control over these assets can be undertaken independently by each investor, which is different from traditional corporations, in which managers typically remain in control over the assets even after investors have sold their shares in the market. Fama and Jensen (1983) argue that the strong role of market governance implies that other mechanisms for monitoring managerial actions (non-market governance) are less important for financial mutuals. Yet, regulatory bodies such as the Securities and Exchange Commission (SEC) have recently emphasized the importance of non-market governance mechanisms such as the board of trustees, and several academic papers show benefits from board oversight for investors.[1]

We examine the roles of market and non-market governance for a specific type of financial mutual, a variable annuity policy. A typical variable annuity policy is a retirement account that allows investors to allocate money among various offerings of managed funds (so-called subaccounts). In spite of the relatively large market for variable annuities (over $1.3 trillion in the United States)[2] research on variable annuities has been relatively sparse.[3] We focus on variable annuities, however, not because of the size of this market but because variable annuities have two institutional features that uniquely allow us to examine the roles of market and non-market governance. First,

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[1] For example, Tufano and Sevick (1997) find evidence that fees are lower for mutual funds whose boards are smaller and have a larger fraction of independent directors. Zitzewitz (2003) shows that the incidence of stale-pricing in fund complexes is higher for funds with fewer independent directors. Khorana, Tufano, and Wedge (2006) find that there is a higher probability of a merger if a fund has underperformed and if it has a higher fraction of independent directors. Ding and Wermers (2005) find that a larger number of outside directors are more likely to replace a poorly performing manager.

[2] The Association for Insured Retirement Solutions (NAVA) reports that the total assets under management in variable annuities as of December 31st, 2006 is $1.3567 trillion.

[3] An excellent overview of the area can be found in Brown and Poterba (2006) and Poterba (2001). Poterba (2001) summarizes the history of annuity contracts in the United States, and Brown and Poterba (2006) offer details about the market for and taxation of variable annuity products, and characterize which households hold variable annuity products.

many variable annuity subaccounts are 'clones' of popular mutual funds so there is a natural control sample. We use this control sample to compare the sensitivity of flows to performance and fees (market governance) from both variable annuity and mutual fund investors. We show that mutual fund investors and variable annuity investors holding virtually the same fund have different reactions to poor performance and high fees. The fund-flow – performance and fund-flow – expense ratio relation is considerably weaker for variable annuity funds than for mutual funds. Given this finding of reduced market governance for variable annuity investors vis-à-vis mutual fund investors in the same asset, we ask whether non-market governance mechanisms are more pronounced for investors in variable annuity policies. To address this question, we use the second feature of variable annuities. Because a variable annuity policy consists of a number of managed subaccounts, similar to a fund-of-funds structure, the insurance sponsor of the policy can act on behalf of investors (non-market governance) in making changes to the investment opportunity set offered by the policy. Actions that could benefit investors, such as the addition of a new subaccount or a change in subadvisor for a given subaccount, are common. Consistent with the complementary role of market and non-market governance suggested by Fama and Jensen (1983), we find that either new subaccounts are added or subadvisors are changed by the insurance sponsor when existing subaccounts have poor performance and high fees, even though investor flows are relatively insensitive to either of these fund attributes. However, the provision of non-market governance is adversely affected when the insurance sponsor has an affiliation with the subaccount's advisor.

To better understand our examination of non-market governance it is important to understand the organizational structure of the variable annuity industry. Insurance companies offer variable annuity policies to investors. Each variable annuity policy offers a set of managed portfolios or subaccounts (the average number of subaccounts in our sample is around 30) that policy holders can invest in. We observe two principal structures for variable annuity policies in our data. In the first structure, sponsor-only, the insurance company or an affiliate sponsors the variable annuity but does not take an advisory role. In this role as sponsor, the insurance company exercises considerable control over which funds are offered as subaccounts and under which conditions, and could take on an important monitoring function even though they have no requirement

for direct board oversight (see Appendix C for additional details regarding the board governance of variable annuities). We analyze the decision of the variable annuity sponsor to add additional investment options in the form of new subaccounts.[4] We distinguish between the decisions to add an unaffiliated or affiliated subaccount to highlight the role of true independence in governance decisions.

In the second structure, sponsor-advisor, the insurance company acts as the policy sponsor and an affiliate of the insurance company acts as the principal investment advisor. As an advisor to the subaccounts in the policy, the insurance-company affiliated advisor contracts with either affiliated or unaffiliated subadvisors to manage the subaccounts. In this structure, the insurance company advisor can terminate a subadvisory agreement, but it requires the approval of the board of directors of the advisor to do so. We again distinguish between unaffiliated and affiliated accounts to properly understand the incentives of the monitor.

We find that the addition of subaccounts to variable annuity policies depends on the performance of the existing investment choices. If the existing investment choices perform poorly, insurance firms tend to add other subaccounts in that asset class. We also observe, however, different actions by the insurance firm for additions of unaffiliated and affiliated subaccounts. Unaffiliated subaccounts are added after poor performance and if fees of existing accounts are high, but having affiliated accounts in the same asset class reduces the probability of an addition. The addition of affiliated accounts is positively related to past fund-flow in the asset class, to lower fees in the existing accounts, but not to past performance.

In the sponsor-advisor structure, we find that high fees and poor performance of existing advisors are statistically and economically important determinants of the board's decision to replace an unaffiliated subadvisor. However, when the board of trustees replaces an unaffiliated subadvisor with an affiliated advisor, we do not find that the replacement decision is related to performance and fees.

[4] We do not focus on the removal or substitution of subaccounts as it is a relative infrequent event in our sample. This infrequency may be due to the 1940 Investment Company Act requirements that requires additional SEC approval of such actions. Section 26 (c) of the Investment company act of 1940 states that: "It shall be unlawful for any depositor or trustee of a registered unit investment trust holding the security of a single issuer to substitute another security for such security unless the Commission shall have approved such substitution."

The results of our paper have important implications for the recent debate on governance in mutual funds.[5] While the recent legislative efforts are focused on strengthening the role of independent trustees in mutual fund complexes, they have largely ignored a more fundamental issue in mutual fund governance: both the interested and independent trustees are initially appointed by the sponsor of the mutual fund itself.[6] Our evidence suggests that affiliations between the monitor and the monitored entity can create conflicts of interest that interfere with effective governance. Whenever the provider of governance in financial mutuals is truly independent of the management of the mutual fund, we find that they act more on behalf of their shareholders.

The remainder of the paper is organized as follows. Section 2 describes our data, the variable annuity market, and the sample construction. Section 3 contains the empirical results on the fund-flow – performance and fee sensitivities of variable annuities relative to mutual funds. Section 4 carries out the empirical tests on the relevance of non-market governance, and Section 5 concludes.

1 Data and Sample Construction

1.1 Data

The variable annuity database and the mutual fund database we use are both from Morningstar.[7] Annual snapshots from 1997 to 2005 are constructed from the Morningstar Principia Mutual Fund and Principia Variable Annuity databases. We obtain monthly total net assets and return data from the fund databases.

1.2 Variable Annuity Policies

An insurance company frequently offers their customers more than one variable annuity policy to choose from. Different variable annuity policies have different death

[5] The role of boards in financial mutuals generally and mutual funds specifically, has been a recent topic of interest to the SEC. In June of 2006, a Washington D.C. Circuit Court struck down the SEC's proposed fund governance rule that would require fund boards to have an independent chair and to be comprised of 75% or greater independent directors. The SEC recently reiterated its desire to address the issue, albeit in a different form than the previous regulation.

[6] Many industry observers have argued that the structure of boards in mutual funds is ill-suited for true oversight. See, e.g., the references cited in SEC (1992).

[7] Variable annuities can be purchased both inside and outside of retirement plans. We focus on annuities purchased using non-retirement plan assets, which are non-qualified annuities.

benefits, investment choices, mortality and insurance expenses, and surrender charges associated with them.

Each variable annuity policy offers its investors a set of managed portfolios (so-called subaccounts) that they can invest in. Equity and bond portfolios are the most common options. While the insurance-related charges are typically constant across all subaccounts for a given variable annuity policy, the expense ratio (which includes the compensation for the management of the subaccount) varies across subaccounts for the same annuity policy. Appendix A contains a detailed description of the eight different variable annuity policies offered by Allianz Life Insurance of North America.

Table 1 shows summary statistics for the variable annuity policies in our database for the year 2005. There are 1,162 different variable annuity policies offered by 103 different insurance companies. Table 1 shows the different investment choices, fees, surrender penalties and death benefits offered.

The average policy offers its holders the choice among 35.6 (median: 33) different subaccounts. These subaccounts are offered by 8.6 (median 8) different subadvisors. The mortality expenses per policy are 103.6 basis points on average. In addition, the insurance firms levy, on average, 10.4 basis points of administrative charges and 1.4 basis points of distribution charges so that the total fees collected by the insurance firm are 115.4 basis points. These numbers are consistent with those reported by Brown and Poterba (2006). The considerable insurance-related fees of 115 basis points have been criticized in the business press and in academic studies. There is also evidence that the mortality expenses exceed the value of the life insurance provided (e.g., Brown and Poterba (2006) and Milevsky and Posner (2001)). The average expense ratio that is paid to the advisor of the subaccount is 90.1 basis points, which compares to an average expense ratio of 119.8 basis points for mutual funds in 2005. The total fees paid by the variable annuity holder are 205.8 basis points, on average.

Surrender fees average 5.1% of the value of the initial investment, with an average duration of 4.6 years. Step-up, principal, and accumulation value are the most common death benefits with about 25% each (see Appendix A for details on these benefits).

1.3 Variable Annuity Subaccounts

There are subtle differences between buying mutual fund shares and allocating part of the investment in a variable annuity contract to a subaccount. Mutual fund investors become the owners of the underlying securities of the fund. Variable annuity investors become owners of a unit investment trust. The insurance company creates a segregated investment account, and registers it as a unit investment trust with the SEC. The variable annuity policies are sold by the insurance company through this so-called separate account. The assets of the separate account are the property of the insurance company so that the insurance company is technically the investor. The assets are held for the benefit of the owners and other persons entitled to payments under the variable annuity contracts issued through the separate account.[8]

Subaccounts invest in underlying mutual funds that are advised by investment companies. In our data, we observe two different structures for these policies, sponsor-only and sponsor-advisor. In the sponsor-only structure, the insurance company or an affiliate sponsors the variable annuity and makes decisions as to which subaccounts to add to the policy. While the insurance company does not act as an advisor for the subaccounts, they can select subaccounts for the policy that are managed by affiliated or unaffiliated advisors. In the sponsor-advisor structure, the insurance company or an affiliate of the insurance company acts as the investment advisor for the subaccounts but typically they select other advisors, either affiliated or unaffiliated, to subadvise the subaccount. Appendix B contains a detailed example of both structures using an actual observation from our data. Appendix C contains additional information on the role of board governance in each of these structures.

1.4 Matching a Variable Annuity Subaccount to its Mutual Fund Counterpart

Since we would like to evaluate the performance and fee sensitivity of variable annuity fund flows *relative* to their mutual fund counterparts to substantiate the claim for

[8] The assets of the separate account, equal to the reserves and other liabilities of the separate account, are not chargeable with liabilities that arise from any other business that the insurance company may conduct and, as a result, unlike most life insurance or fixed annuity products, these assets are not subject to claims by the insurance company's creditors should the insurance company become insolvent.

less market governance of variable annuity investors, we manually match variable annuity funds to their mutual fund counterparts.

The Morningstar database contains a link from variable annuity subaccounts to the underlying variable annuity fund. We match the underlying variable annuity fund with its mutual fund counterpart by hand.

As an example of the matched pair we are creating, we can look at the AIM Variable Insurance (V.I.) International Growth Fund. We match the AIM V.I. International Growth Fund by name to a mutual fund masterlist and identify the AIM International Growth Fund as a promising potential match.

While the title of the fund and the sub-account are very similar, it is possible that the two materially differ in some respects. We therefore employ additional filters – we verify that the two funds have the same investment objective, similar returns, and the same manager. With respect to our example, both the mutual fund and the variable annuity fund are managed by Shuxin Cao, Matthew W. Dennis, Jason T. Holzer, Clas G. Olsson, and Barrett K. Sides. Also, the mutual fund boasts a 2004 return of 23.42% and the variable annuity reports returns of 24.00% for series I and 23.70% for the series II over the same period.

As a last indication of the comparability of the fund and its variable annuity counterpart, figure 1 shows the investments in stocks from the first five countries listed in the schedule of investments for the mutual fund and the variable annuity fund. The investments are virtually identical, only in some of the later countries (not listed) do we find differences in holdings. Note that our matching procedure finds a very close, but not perfect match. For example, the assets under management of the mutual fund are substantially larger than the assets under management of the variable annuity fund. We are able to initially match 1,005 variable annuity funds with their mutual fund counterparts.

Once we have the initial matched sample, we employ three additional filters. First, the time series of returns from the two matched funds is required to have a statistically significant correlation of 0.95 or greater to guarantee that we are indeed matching on the same underlying fund. This step leaves 670 matches. Second, only those variable annuity funds that can be identified by name as separate accounts of insurance

companies are kept, which leaves us with 273 matches. Third, those matches with monthly flows less than 400% of the fund size and greater than -100% of fund size are kept. The final sample includes 180 matches.

Table 2 shows summary statistics for the matched sample. The size distribution of both variable annuity funds and mutual funds is right-skewed. The average size of mutual funds (variable annuity funds) is $826 million ($669 million), but the median size is only $67 million ($127 million). Mutual funds are older and have higher expense ratios. The gross returns of the variable annuities and the matched mutual funds are statistically indistinguishable from each other. This result strengthens our claim that variable annuity funds and their matched twin mutual funds have indeed very similar portfolio holdings. However, the net returns and other performance metrics based on returns less fees are higher for mutual funds than for variable annuity funds, because the net returns to variable annuity funds also incorporate the insurance charge for mortality expenses. Finally, mutual funds exhibit larger monthly net inflows.

2 The Relative Importance of Market Governance

If investors follow the performance of their funds closely, and if they vote with their feet, we would expect the flows into funds to depend on past returns and fees. We study the sensitivity of percentage net fund flow to a measure of total returns, controlling for other determinants of fund flow.

We follow Sirri and Tufano (1998) and define net percentage fund flow as the net growth in fund assets beyond reinvested dividends. It is calculated as

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} \times \left(1 + R_{i,t}\right)}{TNA_{i,t-1}},$$

where i indexes funds and t either months or years. TNA is total net assets. Our measure implicitly assumes that all flows occur at the end of the year, but all our conclusions hold if we change the denominator to an average of past and current TNA or assume that the flows come at the beginning of the year.

Note that we are especially interested in the performance sensitivity of the group of variable annuity investors *relative* to the group of mutual fund investors. We employ two specifications. First, we use data on all variable annuity funds and, for each variable

annuity fund, we randomly choose a mutual fund that is in the same investment objective category and was founded within a year of the variable annuity fund, and estimate a regression using annual flows. Second, we choose a more elaborate specification and use our matched twin sample and study monthly percentage flows.

The two right-hand side variables of interest are the 3-year total return of the fund and the fund's expense ratio.[9] In some specifications, we differentiate between 3-year total return above and below the median to allow for potential asymmetries in the fund-flow performance relation. We control for the previous year's net flows, the expense ratio, the size and the age of the fund in the regression specification. In addition, we include year-investment objective fixed effects for the variable annuities and mutual funds in the first specification. These fixed effects allow variable annuity funds and mutual funds in each investment objective class in each year to have a separate intercept.

Table 3 shows the result of the multivariate OLS regression for the first specification. We see from table 3, column 1 that both variable annuity funds and mutual funds display a positive relation between percentage net fund flow and past returns. The 3-year total returns have coefficients of 0.165 (variable annuities) and 0.211 (mutual funds). A one standard deviation increase in mutual fund returns would increase flows by over 20%. The coefficient for mutual funds is comparable to the coefficient reported by Sirri and Tufano (1998). We test whether the coefficients for mutual funds and variable annuities are statistically different from each other and are able to reject that the past return coefficient for variable annuities is equal to that of mutual funds at less than the one percent level. In other words, the fund flow – past return sensitivity is significantly larger for mutual funds than for variable annuity funds.

Column two allows for asymmetries in the fund flow – performance relation by interacting the past three-year return with an indicator variable for above or below median investment objective class performance in a given year. Interestingly, we find that the difference between the fund flow – performance sensitivities of mutual funds and variable annuity funds appears to be driven by poorly performing funds. The coefficients on 3-year total returns above the median for variable annuity funds and mutual funds are

[9] We obtain quantitatively and qualitatively similar results if we use other measures for performance attribution such as Jensen's alpha or a four-factor alpha.

statistically indistinguishable from each other at 0.315 and 0.303, respectively. Both variable annuity and mutual fund investors appear to react to good past performance. Mutual fund investors who hold funds with a prior performance below the median investment objective class fund's performance are performance sensitive, while variable annuity investors are not. If performance is poor, variable annuity investors do not appear to withdraw their monies from a fund to reallocate them to other investment options. Mutual fund investors appear to vote with their feet, as indicated by the positive and significant coefficient, although the fund flow – performance sensitivity is lower for poorly performing funds than for well performing funds.

In addition, we learn from table 3 that the expense ratio is associated with fund flow for mutual funds, but not for variable annuities. For mutual funds, columns one and two show that the higher is the past year's expense ratio, the lower is the fund flow. The relation is indistinguishable from zero for variable annuity funds.

The control variables have the expected sign. Large funds receive smaller percentage inflows, past high inflows are correlated with current high inflows (for mutual funds), and the younger the fund, the higher the inflow (for variable annuity funds). Note that our results are consistent with the results on the fund-flow performance and fee sensitivities reported by earlier papers (e.g., Ippolito (1992), Chevalier and Ellison (1997), Sirri and Tufano (1998) and Barber, Odean, and Zheng (2005)). For example, the R-squared of our regressions of about 19% compares well with the R-squared of 14.2% obtained by Sirri and Tufano (1998).

Table 4 shows results from a fund flow – performance sensitivity regression using our matched twin sample and monthly flows.[10] While we control in table 3 for several exogenous variables that could ex ante influence both past return and fund flows, our twin sample allows us to draw stronger conclusions if we find a similar relation: by taking the difference in flows between a mutual fund and its variable annuity counterpart with the same manager and the same underlying fund, we remove the component of flows that is due to fund or manager specific characteristics. The dependent variable is the difference between the percentage net fund flow into a mutual fund and the

[10] Repeating the analysis in Table 4 with annual flows, similar to Table 3, gives coefficients with similar signs to those reported, but the sample size is reduced so dramatically that none of coefficients are statistically significantly different from zero.

percentage net fund flow into the matched twin variable annuity fund. A larger value for the dependent variable means a proportionally larger inflow into the mutual fund than into the matched variable annuity fund. The variables of interest are the 3-year total return of the mutual fund and the expense ratios of the variable annuity and mutual fund. Note that one of the sample construction criteria was a return correlation of 0.95 between the mutual fund and the variable annuity fund return, so we cannot include both return measures in the regression framework.[11] The results of columns 1 and 2 show a similar relation as the one presented in table 3. The difference in net fund flow is positively related to the total return measure. In other words, the higher is the past return, the more money is flowing into the mutual fund *relative* to the twin variable annuity fund. When we split mutual fund and variable annuity fund performance into above and below median investment objective performance, we see that the difference in fund flows is more sensitive to performance below the median than to performance above the median, which is consistent with the results of table 3. Note however that in our twin sample, the above median return also has a positive sign, which is suggestive of higher performance sensitivity for mutual funds even when the fund is performing well. Neither the variable annuity nor the mutual fund expense ratio are statistically significantly related to the difference in fund flow.

Overall, we conclude from the evidence presented in tables 3 and 4 that variable annuity investors are significantly less performance and fee sensitive than investors in mutual funds. While our analysis here does not shed light on the explanation for the lower performance and fee sensitivity of variable annuity investors relative to mutual fund investors, there are a number of possible explanations. Because variable annuities are a pure retirement vehicle, it is possible that the longer investment horizon of these investors contributes to the lower sensitivity. There are also higher costs associated with switching between variable annuity policies (surrender fees, switching fees, etc), tax penalties for withdrawing the money early and additional paperwork required for switching between policies (1035 exchange) to ensure the switch is not a taxable event. All of these reasons may play a role in the observed lower fee and performance sensitivity of variable annuity investors.

[11] The results are virtually identical if we use the variable annuity fund performance instead.

3 The Role of Non-Market Governance

We now discuss the two main candidates for the provision of non-market governance in variable annuity policies. We start with the role of the insurance firms in the sponsor-only structure in Section 3.1. In Section 3.2, we examine non-market governance in the sponsor-advisor structure.

3.1 The Sponsor-Only Structure: Selection of New Subaccounts

Variable annuity investors can invest in a wide array of funds in different investment objective classes. The insurance firm controls the available investment options of a given policy and can choose to add a new subaccount to an existing investment objective class or to an entirely new class. Recall that variable annuity investors cannot invest outside of the subaccounts offered by their policy. Insurance firms therefore perform an important task on behalf of their investors: they can add to the list of subaccounts that are offered within each policy, or they can remove existing subaccounts.[12]

We examine the determinants of adding new subaccounts in one of Morningstar's investment objective classes. In particular, we test whether insurance companies are performance and fee sensitive with respect to the subaccounts they offer. We focus on the role of performance and fees because the variable annuity investors are relative performance and fee insensitive as seen in Tables 3 and 4. According to Carhart (1997), poor performance persists and higher expense ratios are associated with underperforming funds. As a result, investors should avoid poor performing, high fee funds.

We estimate in table 5 a probit regression where the dependent variable is equal to one if a new subaccount is added by the policy in an investment objective class in a given year and zero otherwise. If insurance firms monitor their existing accounts on behalf of

[12] The American Academy of Actuaries 2006 report (American Academy of Actuaries (2006)) suggests that opening new subaccounts may be a more common mechanism for adjusting investment options for investors than closing down subaccounts or changing subadvisors due to the regulatory complexity of the latter two:
"Any change in the fund offerings is subject to the necessary regulatory approvals. The substitution of one fund for another or the combining of several investment options into a single fund is generally more complicated and time-consuming than adding a new option or closing an existing investment option to further allocation by contract holders. Substitution of one fund for another typically involves a substitution application to the SEC and possibly requires underlying variable annuity contractholder approval."

investors, we would expect insurance firms to add new subaccounts to a specific investment objective class if the performance of the existing accounts is poor relative to all available funds within that class. We measure performance of the offered subaccounts either by the total return over the past 36 months relative to the average 36 month total return in the same investment objective class of the Morningstar universe or by the four-factor alpha of the existing subaccounts. Also, if insurance companies act in the interest of their variable annuity investors, we would expect new subaccounts to be added if the fees of existing accounts are high. We measure fees as expense ratios minus the investment objective class average expense ratio.

We carefully control for other variables that may influence the decision to add subaccounts. We conjecture that the decision to add a new subaccount depends on the number of self-managed subaccounts the variable annuity policy already offers, and on the relative popularity of that investment objective class in the entire variable annuity fund universe, as measured by the percent of total variable annuity flows to that specific investment objective class. We add year-fixed effects and adjust standard errors for clustering on a variable annuity policy level. Note that we only look at the decision to add subaccounts to an investment objective class that is already established, and that we do not address the question of when an insurance firm adds a completely new investment objective class.

Table 5 reports the marginal effects of the probit regression. The relative performance of the existing subaccounts decreases the probability to add a new subaccount in that investment objective class. In other words, if the relative performance of existing subaccounts is poor, insurance firms add new accounts to their policies. The results do not change if we use the 24-month four-factor alpha instead of the relative return measure (column 2). However, the economic effect appears small. A one standard deviation decrease in the relative return (alpha) increases the probability of an addition of a subaccount by 0.4% (0.5%). The relative expense ratio has a coefficient that does not appear to be different from zero. The control variables have the expected signs. If a particular investment objective has seen a lot of past fund flow, it is more likely that a subaccount is added. If an insurance firm manages subaccounts in the same investment objective class, it is considerably less likely to add additional accounts.

Overall, we conclude from the results in table 5 that insurance firms appear to monitor the performance of their subaccounts and weakly react to poor performance by adding competing accounts as choices for their investors.

Table 5 does not differentiate whether the insurance firm adds a subaccount that is managed by an affiliated entity, or whether it adds a subaccount that is managed by an outside advisor. However, such a distinction may be important if we want to capture the true incentives for additions of accounts. In Table 6, we therefore estimate a multinomial logit regression in which we estimate separate coefficients for the addition of an outside subaccount and an affiliated subaccount.

Results from two separate regressions are reported in Table 6. Columns 1 and 2 report results for the first multinomial model, in which we employ the investment objective-adjusted return as a benchmark, and columns 3 and 4 report results for a multinomial model in which the 4-factor alpha is the main measure of performance attribution. Columns 1 and 3 report the changes for independent variables in the probability ratios of an addition to an outside subaccount against no addition. Columns 2 and 4 report the corresponding values for additions of an affiliated advisor against no addition. A positive number in these regressions indicates that an increase in the independent variable makes it more likely that a new subaccount is added.

The results of columns 1 and 2 show that the determinants of subaccount additions are different for the additions of an unaffiliated-advised subaccount and an affiliated-advised subaccount. Column 1 demonstrates that an unaffiliated subaccount is added after poor performance and if relative expense ratios are high. But column 2 shows no association of performance and an addition of an affiliated subaccount. Furthermore, affiliated subaccounts are added when expense ratios of existing accounts are low relative to the average expense ratio in the same investment objective class. The economic magnitude of the reported coefficients can be gauged by taking the exponential of the coefficient and interpreting it as a relative-risk ratio. For example, the coefficient of 0.206 on the relative expense ratio of column 1 can be interpreted as a 23% higher odds of an addition of an outside-managed subaccount for a one unit change in the relative expense ratio.

This evidence is consistent with insurance firms not wanting to cannibalize inflows into their own subaccounts, as they are significantly less likely to add outside subaccounts if the fraction of affiliated subaccounts in a given investment objective class is high. However, column 2 shows that if the fraction of affiliated accounts is high, insurance firms are more likely to add new affiliated accounts. One interpretation of this result is that insurance firms do not mind if a possible fund outflow from an affiliated account is compensated by a fund inflow into another affiliated account, but that they are reluctant to offer outside competition to an investment objective in which affiliated advisors are well established. Both the addition of an outside and affiliated subaccount is more likely if the relative dollar flow into the investment objective class across all variable annuity policies was high in the previous year, suggesting that insurance firms react to investors' demands. The multinomial model allows us to test the equality of coefficients across the different outcome variables. When we test within the multinomial logit model whether the coefficients are different across columns 1 and 2, we are able to reject the equality of coefficients for the expense ratios, the fraction of affiliated accounts, and the relative dollar flow. Insurance are more likely to add affiliated subaccounts than to add independent subaccounts whenever existing investment options have lower fees, are offered in-house, and exhibit particularly strong interest from investors. Columns 3 and 4 repeat the multinomial analysis, but use the four-factor alpha as a performance benchmark. Column 4 documents that more affiliated accounts are added after poor performance of existing accounts when we use the four-factor alpha as a benchmark. The other coefficients are qualitatively and quantitatively similar to the specification of columns 1 and 2. Tests of equality of coefficients across columns 3 and 4 reject the null hypothesis for the relative expense ratio, the fraction of affiliated accounts, and the relative dollar flow into the investment objective class.

Overall, the results from table 5 and 6 are mixed about the governance role of insurance firms. While insurance firms tend to react to poor performance and higher fees by adding more subaccount choices for their annuity investors, there is some evidence that they do not necessarily behave in the best interest of their investors whenever they have a conflict of interest caused by an affiliation with the fund's manager.

3.2 The Sponsor-Advisor Structure: Replacing Subadvisors

As discussed in Tufano and Sevick (1997), two principal responsibilities of mutual fund boards are to approve contracts with fund advisors and to negotiate management fees and expense ratios with those advisors. We concentrate our analysis on the approval of contracts with fund advisors, because the management fees and expense ratios we observe in our data are potentially contaminated by undisclosed revenue sharing agreements between the insurance firm and the fund advisors.[13]

We examine the role of non-market governance in the sponsor-advisor structure by analyzing the determinants of the decision to renew or replace an existing subadvisor. Tufano and Sevick (1997) describe that a non-renewal of an advisory contract is a rare event in the universe of mutual funds. In their paper, they mention that to the best of their knowledge, over a span of 30 years, boards of mutual funds have only replaced a fund advisor against the advisor's wishes three times. We therefore concentrate in this section on the variable annuity funds that are managed by insurance-affiliated trusts, in which the insurance affiliated advisor frequently subcontracts with outside investment advisors.

We have a total of 1,326 fund-year observations with complete data for eleven trusts. In 102 fund-year observations, we observe a decision not to renew a management contract and to change the subadvisor. Therefore, a change of subadvisor occurs in 7.7% of all fund-years. We test whether a fund's trust changes the subadvisor because of poor performance and high fees, carefully controlling for other determinants that may influence the decision to change subadvisors.

Table 7 presents the results of a probit regression of the decision to replace a fund manager. The sample period is 1997 to 2005. The regression is estimated annually, and the dependent variable is 1 if the manager is replaced in the next year or 0 otherwise. Table 7 reports marginal effects. Several advisor characteristics are included as independent variables. The principal variables of interest are measures of performance and expense ratios. As in the previous section, we estimate two separate specifications with different performance metrics and different time horizons to establish the robustness of our results. Columns 1 and 3 of Table 7 use the manager's investment objective-adjusted return R_{Fund}-R_{InvObj} over the past 36 months as a performance measure, and

[13] See, e.g., American Academy of Actuaries (2006).

columns 2 and 4 use a four factor alpha (Fama-French factors plus momentum) over the past 24 months as the performance measure. We include the investment objective-adjusted expense ratio as our second main variable of interest. As controls, we add the age of the fund, the investment objective-adjusted annual fund turnover (the minimum of purchase and sales divided by the fund size), and the natural log of fund size. Columns 1 and 2 of Table 7 show that the higher the expense ratio of a fund relative to the expense ratio of the investment objective class, the more likely it is to that the current manager is replaced. The magnitude appears economically significant: A 50 basis points higher expense ratio makes it approximately 4% more likely that a subadvisor is replaced. Fund age, turnover and net assets do not influence the decision to replace a subadvisor.

Interestingly, poor investment objective adjusted performance of a given fund over the previous two years does not seem to influence the decision to replace a subadvisor. However, column 2 shows that the alternative performance benchmark, the four-factor alpha measured over the past 24 months, has a significantly negative coefficient. A one standard deviation decrease in the four factor alpha increases the probability of an advisor replacement by approximately 1.5%. Column 1 provides some evidence that if an insurance firm's affiliate is managing the assets of the fund, it is significantly less likely to be replaced, but this result is not robust across all specifications.

In columns 3 and 4 of table 7, we also include two of the traditional measures of board governance, board size and board independence as additional right-hand-side variables. Neither board size nor the fraction of independent directors appears to influence subadvisor turnover. Overall, we learn from the probit regressions of table 7 that the main determinant of advisor replacements is a high expense ratio relative to the average expense ratio of the investment objective class.

Table 7 does not differentiate who the new advisor of the fund is, but it may matter whether the new management is an outsider or an entity affiliated with the insurance firm. In Table 8, we separate the changes in subadvisors into two categories. The first category includes all changes of subadvisors in which a subadvisor is exchanged against a different external subadvisor unaffiliated with the insurance firm. The second category comprises all cases in which a subadvisor is exchanged against a subadvisor that

is affiliated with the insurance firm. Table 8 estimates a multinomial logit regression. Two sets of results are reported. Columns 1 and 2 report results for the investment objective-adjusted return over the past 36 months, and columns 3 and 4 report results for the 4-factor alpha over the past 24 months as the main measure of performance attribution. Furthermore, columns 1 and 3 report the changes for independent variables in the probability ratios of a change to an outside subadvisor against no subadvisor change. Columns 2 and 4 report the corresponding values for changes to an affiliated advisor against no subadvisor change. A positive number in these regressions indicates that an increase in the independent variable makes it more likely that the subadvisor changes.

The results of columns 1 and 2 show that the determinants of advisor changes are dramatically different for changes to an outside advisor and changes to an affiliated advisor. Column one demonstrates that a subadvisor is replaced with a different outside manager after poor investment objective adjusted performance and whenever expense ratios are high. Column 2 shows no such association, neither for expense ratios nor for past performance. A test of equality of the coefficients for expense ratio and adjusted return across columns 1 and 2 is rejected at the 10% level, despite the few observations that are used to identify the coefficients in column 2. Columns 3 and 4 repeat the regression analysis, but use the two-year four factor alpha as a measure of performance attribution. Conditioning on only two years of past data increases the sample size and number of replacements, but does not change the inferences drawn from columns 1 and 2. The results are very consistent across the different return measures. High fees and poor past performance influence the decision to replace a fund's manager with another outside manager, but the same characteristics do not influence the decision to change the fund's management to an affiliated entity. Tests of equality of coefficients for the expense ratio and past performance across columns 3 and 4 are rejected at the 5% level.

One interpretation of the evidence of Table 8 is that boards of trustees do their due diligence and replace outside managers after poor performance and if fees are high only when there are no conflicts of interest. If the board of trustees is interested in self-managing a fund, the replacement decision is not based on poor performance and high fees.

4 Conclusion

The asset management industry is a natural setting in which to study the complementary roles of market and non-market governance suggested by Fama and Jensen (1983). We demonstrate that market governance plays a lesser role for variable annuity funds than for mutual funds. Using a database of mutual fund-variable annuity matched pairs, we find that variable annuity investors are considerably less performance and fee sensitive than mutual fund investors. We conjecture that variable annuity investors are less willing or less able to 'vote with their feet', perhaps because they face high surrender charges for early withdrawal of their monies from policies or because they do not monitor retirement investments as closely as they would regular investments.

If market governance and non-market governance act as substitutes, we would expect that the governance arrangements for variable annuity investors differ from those of mutual fund investors, and that non-market governance mechanisms play a stronger role for variable annuity investors.

To examine the role of non-market governance mechanisms in variable annuities, we focus on the role of insurance companies and their affiliates in their roles as sponsors and advisors of the variable annuity policies and subaccounts respectively. We analyze their decisions in two structures, the sponsor-only and the sponsor-advisor structure. In both cases, we find that the decision to add additional new investment options (sponsor-only) or to replace the existing subadvisor (sponsor-advisor) is related to poor performance and high fees of the existing subaccounts or subadvisor consistent with the complementary roles of market and non-market governance suggested by Fama and Jensen (1983). However, there is an important caveat – these actions are only undertaken if there exists no conflict of interest. If the policy sponsor or the board of the sponsor-advisor is adding a fund whose management has ties to the insurance firm, the performance and fee sensitivities either cease to exist or are less pronounced.

We conclude that the oversight the insurance firms and fund boards provide is most effective when they are truly independent of the monitored entity. Our evidence has important implications for the recent debate on governance in mutual funds. It appears that the best non-market governance is provided by entities that are completely unaffiliated with the advisors of the funds.

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Appendix A: The Structure of a Variable Annuity Policy – An Example

Allianz Life Insurance of North America offered eight variable annuity policies with different death benefit options, mortality and insurance expenses and surrender charges in 2004.

The following table shows a summary of the eight policies, and we explain the characteristics – death benefits, mortality expenses, and surrender fees in detail below.

Policy name	Death Benefit	Number of subaccounts	Mortality expenses	Insurance expenses	Max. surrender fee	Yrs after which no surr. fee
USAllianz Alterity	PR or AV	66	1.25	1.4	7	5
USAllianz Charter	PR or AV	68	1	1.15	0	0
USAllianz Rewards	face; face+AV	66	1.5	1.65	8.5	10
ValueLife	N/A	32	0.6	0.75	N/A	N/A
Valuemark II/III	AV, PR or SU	59	1.25	1.4	6	5
Valuemark Income Plus	PR	57	1.25	1.4	5	1
Valuemark IV	SU or RF	59	1.34	1.49	6	7
Valuemark SP Var Life	N/A	32	0.6	0.75	N/A	N/A

In general, there are four different types of death benefits offered to annuity policy holders: accumulation value (AV), rising floor (RF), principal (PR), and stepped-up (SU) death benefits. Accumulated-value death benefits (AV) pay the dollar amount accumulated in the investor's contract at the time of his or her death. The rising floor (RF) benefits pays out principal plus a minimum guaranteed annual increase, which is usually limited to 200% of the premiums paid, less surrenders and withdrawals. The principal death benefits (PR) pay out total premiums less surrenders but take neither gains nor losses into account. The stepped-up benefits (SU) offer the investor to replace the initial base death benefit (total premiums less withdrawals) with the value of the contract at a later date, if it is more attractive.[14] The Allianz Alterity policy, for example, offers policy holders the choice between principal or accumulation value death benefits.

The mortality and expense charge is compensation for the death benefit offered, and the insurance expenses are the sum of mortality and expense charge and any other administrative charges levied by the insurance company.

[14] Some variable annuity policies also offer a guaranteed face value similar to a normal life insurance policy.

Surrender charges are often used in place of front-end sales loads. Usually, the surrender charge is expressed as a percentage of the amount of the money that is either withdrawn or surrendered, and is generally imposed on the premiums paid, and not on capital gains. Similar to back-end loads, surrender charges typically decline over time. For example, the Allianz Alterity variable annuity policy has a surrender charge of 7% that declines each year by 1.4% and consequently is 0 after 5 years.

Appendix B: The Structure of Variable Annuity Policy Subaccounts – An Example

The list of subaccounts for the variable annuity policy USAllianz Rewards in 2004 contains subaccounts that are advised by an investment advisor and an advisor affiliated with the Allianz Life Insurance Company. There are subaccounts that have large, independent advisors (e.g., AIM V.I. International Growth managed by AIM advisors) and subaccounts which have advisors affiliated with the Allianz Life Insurance Company (e.g., USAZ PIMCO Growth & Income, managed by US Allianz advisors and subadvised by PIMCO). The following table shows the list of subaccounts available to USAllianz Rewards variable annuity policy holders that are offered by the investment advisor AIM and by the investment advisor USAllianz, the entity affiliated with the insurance company.

Panel A: Funds from the AIM Variable Insurance Funds Trust offered by the Allianz Reward Variable Annuity Policy

Fund Name	Expense ratio
AIM V.I. International Growth	1.09
AIM V.I. Growth Fund I	0.91
AIM V.I. Capital Appreciation Fund I	0.85
AIM V.I. Premier Equity I	0.85

Panel B: Funds from the USAZ Variable Insurance Products Trust offered by the Allianz Reward Variable Annuity Policy

Fund Name	Expense ratio	Fund Name	Expense ratio
USAZ Money Market	0.87	USAZ Alliance Capital Technology	1.25
USAZ Van Kampen Emerging Growth	1.1	USAZ Van Kampen Comstock	1.2
USAZ Van Kampen Aggrssv Growth	1.25	USAZ Van Kampen Growth	1.2
USAZ PIMCO Value	1.1	USAZ Alliance Capital Large Cap Grw	1.1
USAZ PIMCO Renaissance	1.2	USAZ AIM Blue Chip	1.15
USAZ Alliance Capital Growth & Inc	1.1	USAZ Oppenheimer Emerging Growth	1.25
USAZ Templeton Developed Markets	1.25	USAZ AIM Dent Demographics Trends	1.2
USAZ Van Kampen Growth & Income	1.1	USAZ AIM International Equity	1.25
USAZ PIMCO Growth & Income	1.1	USAZ AIM Basic Value	1.1

In Panel A, the fund offered by AIM investment advisors is overseen by a trust that AIM set up itself. AIM advisors have created the “AIM Variable Insurance Funds”

trust, which, in 2005, oversaw 27 different funds that were offered as subaccounts through various different variable annuity policies. The structure of ownership of one of these 27 funds, AIM V.I. International Growth Fund, is therefore representative: Three insurance firms hold almost 40% of all assets (Allstate Insurance (25.14%), Hartford Life and Annuity (8.59%), and Lincoln National Life Insurance (6.03%)).

In Panel B, USAllianz Advisor, which is affiliated with Allianz Insurance, is the advisor to a series of funds, belonging to the same USAllianz Variable Insurance Products Trusts. USAllianz advisors do not select individual portfolio securities, but evaluate and select subadvisers for the Trust. USAllianz Advisor does not have any clients other than the trust. The advisor's principal role can be defined as monitoring the subadvisor and making recommendations to the board of trustees. Note however that some of the subadvisors are affiliated with Allianz (such as PIMCO), while others are truly outside managers (such as van Kampen).

Appendix C: The Role of Boards in Variable Annuity Policies

. In our data, we observe two different structures for these policies, sponsor-only and sponsor-advisor. In the sponsor-only structure, the insurance company or an affiliate sponsors the variable annuity and makes decisions as to which subaccounts to add to the policy. Board governance for the individual subaccounts, however, occurs at the fund level. In many cases, the subaccount is a clone of a fund offered by a major outside investment advisor where the fund is overseen by a trust that was set up by the major investment advisor itself. Funds under this structure collect monies from many variable annuity policies offered by different insurance firms. Ownership in the fund is concentrated, because insurance firms remain owners of the assets through the unit investment trusts. The fund, along with many other funds, is overseen by a board of trustees that was first chosen by the investment advisor. The variable annuity fund closely resembles a regular mutual fund offered by the advisor. Although the variable annuity fund and the corresponding regular mutual fund of the investment advisor are completely separate entities organized as separate trusts, they almost always share the same board of trustees. The potentially misaligned incentives that plague regular mutual funds and its boards – the management company who is supposed to be supervised originally chose the trustees that supervise – also plague this structure, and it is very unlikely to observe involuntary terminations of subadvisory contracts.

For the case of a sponsor-advisor, the advisor can manage the fund itself, but frequently does not do so. The insurance-affiliated advisor often evaluates and selects a subadvisor to manage the portfolio decisions of the fund. Sometimes, the investment advisor does not have any clients other than the trust. The advisor's principal role can then be defined as monitoring the subadvisors and making recommendations to the board of trustees. Under this structure, investment advisor and trustees do not seem to be subject to the same conflict of interest that often arises in the other structure. For example, consider the following excerpt from the statement of additional information of the USAllianz VIP Trust:

"The Manager (USAllianz Advisors) does not provide investment advice with regard to selection of individual portfolio securities, but rather evaluates and selects

Subadvisers for the Trust, subject to the oversight of the Board of the Trust. The Manager monitors and reviews the activities of each of the Subadvisers to the Trust. In addition, the Manager constantly evaluates possible additional or alternative subadvisers for the Trust. The Manager currently does not have any clients other than the Trust."

USAllianz advisors are an extreme case in that they do not manage any fund themselves. A typical insurance-affiliated advisor may manage some funds itself and choose independent subadvisors for other investment objectives.

Figure 1: Schedule of Investments for the AIM International Growth Mutual Fund and the AIM V.I. International Growth fund

Variable Annuity fund Total Net Assets: $301.7 Million			Mutual Fund Total Net Assets: $1,593.0 Million		
Country	% Invested	Investments	Country	% Invested	Investments
Australia	3.12%	BHP Billiton, Coca-Cola Amatil, Promina Group, QBE Insurance	Australia	2.94%	BHP Billiton, Coca-Cola Amatil, Promina Group, QBE Insurance
Austria	0.61%	Erste Bank der Oesterreichischen Sparkassen	Austria	0.58%	Erste Bank der Oesterreichischen Sparkassen
Belgium	1.14%	Algemene Maatschappij, KBC	Belgium	1.09%	Algemene Maatschappij, KBC
Bermuda	0.64%	Esprit Holding Ltd.	Bermuda	0.63%	Esprit Holding Ltd.
Brazil	0.71%	Companhia de Bebidas das Americas	Brazil	0.69%	Companhia de Bebidas das Americas

Table 1: Summary Statistics for Variable Annuity Policies

The Table shows summary statistics across 1,162 different variable annuity policies offered by 103 insurance firms in 2005. The data comes from Morningstar. No. of subaccounts is the number of different investment options a policy holder can choose from. No. of subadvisors is the number of different investment advisors offering the subaccounts. Mortality & expense, administrative, and distribution fees are generally constant per policy and are collected by the insurance firm. The expense ratio is subaccount-specific, and the table reports average expense ratios per policy. All fees are reported in basis points. Surrender charge is expressed as fraction of assets invested and is the penalty paid by investors if they redeem assets prematurely. Maximum number of years is the number of years after which the surrender charge ceases to exist. Death benefits list the fraction of policies that offer one of the four main death benefits. Surrender charges and death benefits are explained in detail in appendix A.

	Mean	Median	Minimum	Maximum	Std Dev
1. Investment choices					
No of subaccounts	35.6	33.0	1.0	218.0	20.8
No of subadvisors	8.6	8.0	1.0	39.0	6.0
2. Fees					
a) Fees levied by insurance company (in basis points)					
Mortality & Expense Fee	103.6	110.0	0.0	210.0	36.3
Administrative Charge	10.4	10.0	0.0	95.0	13.0
Distribution Charge	1.4	0.0	0.0	100.0	6.7
Total Insurance Fee	115.4	125.0	0.0	235.0	41.0
b) Fees levied by fund managing subaccount (in basis points)					
Average expense ratio (varies by subaccount)	90.1	90.2	17.7	211.4	16.6
Average total expense ratio (Insurance + Subaccount)	205.8	212.6	48.0	366.4	48.8
3. Surrender Fees					
Fee as fraction of assets	5.1	6.0	0.0	100.0	6.4
Maximum no of years	4.6	6.0	0.0	11.0	3.5
4. Death Benefits					
% offering Step-up benefit	25.6%				
% offering Rising floor benefit	7.2%				
% offering Principal benefit	27.0%				
% offering Accumulation value benefit	27.4%				
% offering other death benefits	12.8%				

Table 2: Descriptive Statistics of the Matched Sample

The Table presents descriptive statistics from our matched sample. Using data from 1997 to 2005, mutual funds and their variable annuity counterparts are matched on the basis of the name, manager and investment objective of the fund. The initial matches are filtered in three ways. First, the time series of returns from the two matched funds has to have a statistically significant correlation of 0.95 or greater. Second, only those variable annuity funds that are separate accounts of insurance companies are kept. Third, those matches with monthly flows less than 400% of the fund size and greater than -100% of fund size are kept. The final sample includes 180 matches. For each mutual fund and variable annuity observations the mean, median and standard deviation are included along with the p-value from a difference in means (t-test) and difference in medians (Wilcoxon signed-rank) test.

	Mutual Funds			Variable Annuities			Diff. Tests p-value	
Variable	Mean	Median	Std.Dev.	Mean	Median	Std.Dev.	Mean	Median
Size ($MM)	$826	$67	$2860	$669	$127	$2096	<0.01	<0.01
Expense Ratio (%)	1.39%	1.38%	0.58%	1.09%	1.03%	0.52%	<0.01	<0.01
12b-1 Fee (%)	0.32%	0.29%	0.26%	-	-	-	-	-
Insurance Expense (%)	-	-	-	1.11%	1.25%	0.44%	-	-
Turnover	260%	91%	598%	229%	99%	429%	<0.01	0.20
Age (Years)	10.7	8	10.8	6.8	6	3.6	<0.01	<0.01
Annual Net Ret. (%)	5.17%	6.03%	13.05%	4.59%	5.32%	12.14%	<0.01	<0.01
Annual Gross Ret. (%)	6.71%	7.34%	12.9%	6.77%	7.74%	12.7%	0.13	0.21
Jensen's Alpha (%)	-0.62%	-0.69%	7.44%	-1.01%	-1.39%	6.71%	<0.01	<0.01
4-Factor Alpha (%)	-1.95%	-1.48%	6.01%	-2.40%	-2.15%	4.85%	<0.01	<0.01
Monthly Net Flows (%)	3.6%	0.8%	24.7%	2.2%	0.14%	17.9%	<0.01	<0.01

Table 3 – Flow-Performance Sensitivity – Aggregate Sample

The table presents estimates from a regression of annual percentage net flows to a fund on past fund characteristics. Net fund flow is calculated as the current year's total net assets minus the current value of the previous year's assets, divided by the previous year's assets. The regression pools variable annuity and mutual fund observations but allows separate coefficients for both investment vehicles. The sample for the regression uses data from 1997 to 2005 where for each variable annuity fund (831 different insurance funds) a comparison mutual fund is selected. The comparison mutual fund is randomly selected from the group of funds that are matched by investment objective and by fund age as the variable annuity reference fund. The independent variables in the regression include an intercept, 3-year total return, the previous year's percent net flows, percent flows to the investment objective, log of total net assets, the fund's expense ratio and the fund's age in years. Two specifications of the return variable are used. In first column the regression specification assumes a linear relationship with total return. In next column the regression specification uses return measures that are isolated into above and below median coefficients. Investment Objective-Year fixed effects are included for both the variable annuities and the mutual funds separately. The standard errors are reported in parentheses below the coefficient and are adjusted for clustering at the fund level. The asterisks denote statistical significance as follows: *** - significant at 0.1%, ** - significant at 1%, and * - significant at 5%. Standard errors are included in parentheses.

Table 3, continued

Independent Variable		
Intercept	0.868***	0.790***
	(0.189)	(0.187)
VA 3-Year Total Return	0.165***	
	(0.035)	
MF 3-Year Total Return	0.211***	
	(0.026)	
VA 3-Year Total Return High (Above Median)		0.315***
		(0.058)
VA 3-Year Total Return Low (Below Median)		-0.009
		(0.045)
MF 3-Year Total Return High (Above Median)		0.303***
		(0.051)
MF 3-Year Total Return Low (Below Median)		0.154***
		(0.034)
VA Net Flows (t-1)	0.024	0.018
	(0.027)	(0.027)
MF Net Flows (t-1)	0.095*	0.069*
	(0.038)	(0.029)
VA Log(TNA)	-0.135***	-0.141***
	(0.019)	(0.019)
MF Log(TNA)	-0.077***	-0.087***
	(0.011)	(0.015)
VA Fund Exp. Ratio	-0.009	-0.001
	(0.070)	(0.067)
MF Fund Exp. Ratio	-0.044**	-0.088**
	(0.020)	(0.030)
VA Fund Age (Years)	-0.012***	-0.011***
	(0.003)	(0.003)
MF Fund Age (Years)	-0.004	-0.003
	(0.003)	(0.003)
Total Number of Obs.	5870	5870
R-Squared	18.9%	20.4%
Year*Invest. Objective Fixed Effects	Yes	Yes

Table 4 – Flow-Performance Sensitivity – Twin Sample

The table presents estimates from a regression of monthly relative net flows to a fund on past fund characteristics. The regression uses a matched sample of mutual funds to their variable annuity counterparts. The dependent variable is the difference between the monthly net flows (%) to the mutual fund and the percentage monthly net flows (%) to its variable annuity twin. The independent variables in the regression include an intercept, 3-year total return, the fund's expense ratio and the fund's age in years. Two specifications of the return variable are used. In column I, the regression specification assumes a linear relationship with total return. In column II, the regression uses return measures that are separated into above and below median coefficients. Both columns I and II include fixed effects for each Mutual Fund – Variable Annuity (MF-VA) matched pair and the standard errors are clustered by matched pair. The asterisks denote statistical significance as follows: *** - significant at 0.1%, ** - significant at 1%, and * - significant at 5%. Standard errors are included in parentheses.

Independent Variable	I	II
Intercept	-2.04 (6.51)	-2.30 (6.51)
3-Year Total Return	2.08*** (0.46)	
3-Year Total Return High (Above Median)		2.43** (0.82)
3-Year Total Return Low (Below Median)		1.76** (0.57)
Mutual Fund - Fund Expense Ratio	-5.00 (3.54)	-5.04 (3.58)
Variable Annuity - Fund Expense Ratio	-1.33 (5.66)	-1.24 (5.66)
Mutual Fund Age (Years)	0.11* (0.05)	0.12* (0.05)
Total Number of Observations	3173	3173
Number of Matched Pairs	148	148
MF-VA Pair Fixed Effects	Yes	Yes
Adjusted R-Squared	1.06%	1.03%

Table 5 – Determinants of the Addition of New Subaccounts

The table presents marginal effects from a pooled time-series cross-sectional probit regression of the decision to add a new subaccount in an established investment objective of a variable annuity policy from 1997 to 2005. If an insurance variable annuity policy adds one or more subaccounts in a given investment objective in a given year, the dependent variable for that policy and that investment objective is 1. If no accounts were added, the dependent variable is 0. The units of the regression are variable annuity policy-investment objective-years. The dependent variables include $R_{ExistingSubaccounts}$-R_{InvObj}, the difference in the 2-year equal-weighted total return of the other subaccounts in the same investment objective minus the 2-year equal-weighted average return of all subaccounts in the same investment objective, 4-Factor $Alpha_{ExistingSub}$, the equal-weighted average 24-month 4-Factor alpha (market, size, book-to-market and momentum) of the existing subaccounts, $ExpRatio_{ExistingSub}$-$ExpRatio_{InvObj}$, the equal-weighted expense ratio of the policy's existing subaccounts in the investment objective minus the equal-weighted expense ratio of all subacounts in the investment objective, Inv Obj. Fraction of Total $ Flows, the fraction of total net dollar flows that went to the investment objective in the previous years, and fraction affiliated, the fraction of all existing subaccounts in that investment objective that are managed by insurance-affiliated advisors. The standard errors are clustered by variable annuity policy (1089 different policies). The asterisks denote statistical significance as follows: *** - significant at 1%, ** - significant at 5%, and * - significant at 10% level.

	model 1	model 2
$R_{ExistingSubaccounts}$-R_{InvObj}	-0.001**	
	(0.000)	
4-Factor $Alpha_{ExistSub}$		-0.013***
		(0.004)
$ExpRatio_{ExistingSub}$-$ExpRatio_{InvObj}$	0.008	0.013
	(0.009)	(0.009)
Fraction of affiliated accounts	-0.050***	-0.053***
	(0.005)	(0.005)
Inv Obj. Fraction of Total $ Flows	0.116***	0.124***
	(0.023)	(0.023)
Year-fixed effects	Yes	Yes
Observations	39318	40552
Observed probability	0.134	0.136
Predicted probability	0.130	0.132
Pseudo-R2	0.02	

Table 6 – Determinants of Types of Additions of New Subaccounts

The table presents estimates from a multinomial regression of the decision to add a new subaccount in an investment objective class for a variable annuity policy. The regression is estimated using variable annuity policy-investment objective-years. The sample period is 1997 to 2005. The dependent variable is equal to 0 if the insurance firm did not add a subaccount to an existing investment objective class within a variable annuity policy. It is equal to 1 if the insurance firm added a subaccount managed by an outside entity, and 2 if the insurance firm added a subaccount managed by an entity affiliated with the insurance firm offering the subaccount. For each independent variable, the regression reports changes in the odds ratio of adding a subaccount with an outside advisor (columns 1 and 3) against no addition and changes in the odds ratio of adding a subaccount with an affiliated advisor against no addition (columns 2 and 4). A positive coefficient indicates that as that variable increases the probability of being replaced increases. The following characteristics for the year before the addition (January 1st through December 31st of year t-1) are included as independent variables: $R_{ExistingSubaccounts}$-R_{InvObj}, the difference in the 36 month equal-weighted total return of the other subaccounts in the same investment objective minus the 36 month equal-weighted average return of all subaccounts in the same investment objective, 4-Factor $Alpha_{ExistingSub}$, the equal-weighted average 24-month 4-Factor alpha (market, size, book-to-market and momentum) of the existing subaccounts, $ExpRatio_{ExistingSub}$-$ExpRatio_{InvObj}$, the equal-weighted expense ratio of the policy's existing subaccounts in the investment objective minus the equal-weighted expense ratio of all subacounts in the investment objective, Inv Obj. Fraction of Total $ Flows, the fraction of total net dollar flows that went to the investment objective in the previous years, and fraction affiliated, the fraction of all existing subaccounts in that investment objective that are managed by insurance-affiliated advisors. The standard errors are reported in parentheses and are clustered by variable annuity policy. The asterisks denote statistical significance as follows: *** - significant at 1%, ** - significant at 5%, and * - significant at 10%.

	Multinomial model 1		Multinomial Model 2	
	Addition of Unaffiliated	Addition of Affiliated	Addition of Unaffiliated	Addition of Affiliated
$R_{ExistingSubaccounts}$-R_{InvObj}	-0.008**	-0.011		
	(0.004)	(0.008)		
4-Factor $Alpha_{ExistSub}$			-0.099***	-0.146**
			(0.032)	(0.068)
$ExpRatio_{ExistingSub}$-	0.206**	-0.631***	0.234***	-0.457***
$ExpRatio_{InvObj}$	(0.080)	(0.184)	(0.077)	(0.176)
Fraction of affiliated accounts	-0.633***	0.334***	-0.653***	0.299***
	(0.050)	(0.084)	(0.049)	(0.083)
Inv Obj. Fraction of $ Flows	0.890***	1.300***	0.904***	1.659***
	(0.214)	(0.452)	(0.208)	(0.432)
Year-fixed effects	Yes	Yes	Yes	Yes
Observations	39318	39318	40552	40552
Number of additions	4416	880	4644	920
Pseudo-R2	0.02		0.02	
Chi-square	641.35		752.44	
P-value	0.00		0.00	

Table 7 – Determinants of Advisor Replacement

The Table presents marginal effects from a probit regression of the decision to replace a subadvisor. The regression is estimated using fund-year observations for funds overseen by 11 insurance-affiliated trusts. The sample period is 1997 to 2005. The dependent variable is 1 if the subadvisor is replaced between January 1st and December 31st of year t or 0 otherwise. The regression estimates the probability of being replaced. The following subadvisor characteristics for the year before the change (January 1st through December 31st of year t-1) are included as independent variables: an indicator variable as to whether or not the subadvisor is affiliated with the insurance company overseeing the trust (1=affiliated), the manager's investment objective-adjusted return over the past 36 months (columns 1 and 2), R_{Fund}-R_{InvObj}, 4-Factor Alpha (Fama-French factors plus momentum) (columns 3 and 4) over the past 24 months, the investment objective-adjusted expense ratio, $ExpRatio_{ExistingSub}$-$ExpRatio_{InvObj}$, the age of the matched mutual fund, investment objective-adjusted annual fund turnover (the minimum of purchase and sales divided by the fund size), $Turnover_{Fund}$ - $Turnover_{InvObj}$, the natural log of fund size, Log(TNA), the size of the insurance trust's board and the fraction of the board that is interested (columns 3 and 4). The standard errors are clustered by trust (11 trusts). The asterisks denote statistical significance as follows: *** - significant at 1%, ** - significant at 5%, and * - significant at 10%. Standard errors are included in parentheses.

	Model 1	Model 2	Model 3	Model 4
Affiliated Advisor	-0.036**	-0.011	-0.028*	-0.080
	(0.015)	(0.026)	(0.015)	(0.019)
$ExpRatio_{Fund}$-	0.094**	0.067**	0.108**	0.074**
$ExpRatio_{InvObj}$	(0.037)	(0.031)	(0.037)	(0.032)
R_{Fund}-R_{InvObj}	-0.023		-0.023	
	(0.017)		(0.018)	
4-Factor Alpha		-0.021***		-0.022***
		(0.007)		(0.007)
$Turnover_{Fund}$ -	-0.000	-0.000	-0.000	-0.000
$Turnover_{InvObj}$	(0.000)	(0.000)	(0.000)	(0.000)
log(TNA)	-0.001	-0.002	-0.002	0.001
	(0.006)	(0.007)	(0.006)	(0.007)
Fund Age (years)	0.001	-0.002	-0.001	-0.003
	(0.002)	(0.004)	(0.002)	(0.003)
Board Size			0.000	0.002
			(0.002)	(0.002)
Fraction of Interested			-0.196	-0.230
Directors			(0.148)	(0.157)
Observations	1068	1320	967	1264
Number of manager replacements	69	99	64	92

Table 8 – Determinants of Types of Advisor Replacement

The table presents estimates from a multinomial regression of the decision to replace a subadvisor. The regression is estimated using fund-year observations for funds overseen by 11 insurance-affiliated fund trusts. The sample period is 1997 to 2005. The dependent variable is equal to 0 if the subadvisor did not change between January 1st and December 31st of year t; it is equal to 1 if the fund's management changed to a different outside subadvisor, and 2 if the fund's management changed to an advisor affiliated with the insurance firm offering the subaccount. For each independent variable, the regression reports changes in the odds ratio of replacing a fund with an outside subadvisor (columns 1 and 3) against no change in subadvisor and changes in the odds ratio of replacing a fund with an affiliated advisor against no changes in subadvisor (columns 2 and 4). A positive coefficient indicates that as that variable increases the probability of being replaced increases. The following subadvisor characteristics for the year before the change (January 1st through December 31st of year t-1) are included as independent variables: the manager's investment objective-adjusted return, R_{Fund}-R_{InvObj} ,over the past 36 months (columns 1 and 2), the 4-Factor Alpha (columns 3 and 4) over the past 24 months, the investment objective-adjusted expense ratio, $ExpRatio_{ExistingSub}$-$ExpRatio_{InvObj}$, the age of the fund, investment objective-adjusted annual fund turnover (the minimum of purchase and sales divided by the fund size), $Turnover_{Fund}$ - $Turnover_{InvObj}$, and the natural log of fund size, Log(TNA). The standard errors are reported in parentheses and are clustered by trust (11 trusts). The asterisks denote statistical significance as follows: *** - significant at 1%, ** - significant at 5%, and * - significant at 10%.

	Multinomial model I		**Multinomial model II**	
	Change to Unaffiliated	Change to Affiliated	Change to Unaffiliated	Change to Affiliated
$ExpRatio_{Fund}$-	2.229***	0.651	1.312**	-0.353
$ExpRatio_{InvObj}$	(0.722)	(0.644)	(0.617)	(0.396)
R_{Fund}-R_{InvObj}	-0.601**	0.490		
	(0.281)	(0.636)		
4-Factor alpha			-0.428**	0.087
			(0.169)	(0.207)
$Turnover_{Fund}$ -	-0.002	-0.001	-0.001	0.001
$Turnover_{InvObj}$	(0.002)	(0.005)	(0.001)	(0.002)
Log(TNA)	0.032	-0.212**	0.032	-0.209***
	(0.087)	(0.097)	(0.070)	(0.064)
Fund age	-0.015	0.046	-0.036	-0.095
	(0.038)	(0.081)	(0.033)	(0.100)
Pseudo-R2	0.042		0.037	
Chi-square	39.28		39.81	
p-value	0.000		0.000	
No of changes	60	9	80	19

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