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Prudent man or agency problem? On the performance of insurance mutual funds

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Abstract

Active equity mutual funds managed by insurance companies underperform peer funds by over 1% per year. There is no evidence that insurance funds make less risky investments; instead they have lower risk-adjusted returns and their fund flows are less sensitive to performance when they perform poorly. Across insurance funds, those with heavy advertising, directly established by insurers or using parent firms' brand-names, and those whose managers simultaneously manage substantial non-mutual-fund assets, are more likely to underperform. We conclude that insurers' efforts to cross-sell mutual funds aggravate agency problems that erode fund performance.

JEL classification: G11; G22

Keywords: Insurance; Mutual funds; Prudent man; Agency problem

1. Introduction

The insurance industry has rapidly expanded from traditional insurance operations to other business lines since the 1980s. To date, virtually all major insurance companies sponsor and manage mutual funds. The mutual fund business provides insurance firms diversified revenues and potential synergies through cross-selling of multiple financial products. However, such cross-

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selling does not necessarily benefit mutual fund investors. In fact, this paper documents that active domestic equity funds managed by insurance firms and their subsidiaries (hereafter "insurance funds") typically underperform other active equity funds. During the period from 1990 to 2002, the net returns of insurance funds are lower than their non-insurance peers in 10 out of 13 years, and on average they underperform by 1.6 percent per year.

Why do insurance funds have lower returns? We consider two possible explanations. The first is the "prudent man" hypothesis. Due to both the common law and the Employee Retirement Income Security Act (ERISA), investment managers who have fiduciary responsibilities to investors may behave conservatively to avoid losses on imprudent investments. Several studies, such as Badrinath et al. (1989), Del Guercio (1996), and Gompers and Metrick (2001), find that due to such legal concerns institutional money managers tend to invest in large-cap and liquid stocks. When managing their own investments, insurance firms are subject to the prudent man regulations (e.g., Badrinath et al., 1996), while mutual funds managed by insurers and their affiliates, like other types of mutual funds, are not. However, the asset management subsidiaries of insurance firms often simultaneously manage mutual funds and fiduciary assets for their parents. Therefore it is natural to conjecture that some degree of conservatism may "spill over" and affect the investment decisions of insurance mutual funds.

Moreover, insurance firms face substantial background risks such as the risk from their insurance-underwriting business. Economic theories, such as Pratt (1964), Kimball (1993), and Eekhoudt et al. (1996), suggest that investors facing higher background risks may behave as if they were more risk averse, preferring safer assets with lower returns. In this paper, we use the term "prudent man" (or "prudence concern") in a general sense to describe various reasons that may cause insurance mutual funds to manage investments conservatively.

The second explanation attributes the underperformance of insurance funds to agency problems. As the "market timing" and "late trading" scandals suggest, agency problems may be severe and governance mechanisms may be weak in the mutual fund industry.[1] Unlike executives of publicly traded firms who are constantly subject to the pressure from both the external market for corporate control and internal governance, fund managers face virtually no take-over threats and fund boards are mostly passive. Often the only effective way for investors to put pressure on underperforming funds is to "vote with their feet" by withdrawing money. However, even this last mechanism may fail if fund investors do not vigilantly monitor fund performance. We conjecture that lack of monitoring may be a particularly severe problem for insurance mutual funds. A main reason is that insurance funds are often cross-sold through the extensive broker/agent network of their parent firms. Anecdotal evidence suggests that when selling mutual funds, insurers often emphasize customers' need of owning funds rather than fund performance.[2] Such distributional

[1] "Market timing" and "late trading" scandals came to public light when New York Attorney General, in September 2003, started investigation of pervasive illegal and/or unethical trading practices in the mutual fund industry. "Market timing" refers to the practice by mutual funds to permit favored fund investors to trade more frequently in and out of the funds than what is allowed and specified in fund prospectus or other documents. "Late trading" refers to the practice by mutual funds to permit favored investors to trade fund shares after 4:00 p.m. at that day's closing price. For details of these scandals, see "Special Report: Perils in the savings pool-Mutual Funds", Economist, November 8, 2003.

[2] For example, it is reported that in the bearish equity market of 2001, many insurance funds managed to increase fund assets by directing their clients' attention on retirement planning and the 529 college saving plans. See "Insurers Find Ways to Keep Fund Sales Aloft," National Underwriter (Life & Health/Financial Service Edition), December 16, 2002, by Trevor Thomas; "Insurers Break Into Mutual Fund Arena," National Underwriter (Life & Health/Financial Service Edition), March 22, 1999, by Dennis Gallant; "Farmers P-C Agents Now Selling Variable Products," National Underwriter (Life & Health/Financial Service Edition), January 6, 2003, by Barry Higgins.

and marketing efforts enable insurance funds to reach out to marginal investors who otherwise will not invest in mutual funds. As these investors tend to be need-driven and may be less sophisticated,[3] they are often less informed, rely more on insurance agents for investment advice, and do not monitor fund performance closely. Moreover, many insurance companies sell variable annuities, which are often channeled into the mutual funds they sponsor.[4] Indirect mutual fund ownership by variable annuity buyers could lead to reduced incentive for monitoring fund performance.

Lack of investor monitoring is not the only type of incentive problems insurers' cross-selling efforts may induce. Another important feature of insurance mutual funds is that they are typically managed by the investment management subsidiaries who simultaneously manage separate accounts of in-house assets for the parent insurance firms. These investment subsidiaries essentially serve two principals—both the mutual fund investors and the parent firms, and conflict of interests may arise. Especially, if the performance of insurers' in-house account is more important, fund managers may pay less attention to mutual funds and divert more resources to managing insurers' investments. Finally, casual observations suggest that insurers usually do not offer top dollars to attract or retain talented fund managers, making it difficult for insurance mutual funds to compete for performance.[5] In this paper, we use the term "agency problems" (or "incentive problems") to summarize the effects of lack of investor monitoring, conflict of interests, and compensation issues on fund performance.

We empirically test the prudent man hypothesis and the agency problem hypothesis using a sample of actively-managed US equity funds for the period between 1990 and 2002. Under the prudent man hypothesis, insurance funds may take less risk but their risk-adjusted returns should be no different from other funds. On the other hand, the agency hypothesis predicts lower returns before and after risk adjustment for insurance funds. We therefore compare the risk-adjusted performance of insurance funds with their peers using a battery of risk-based benchmarks, including the CAPM one-factor model, the Fama–French (1993) three-factor model, and the Carhart (1997) four-factor model. Inconsistent with the prudent man hypothesis, the estimated alphas and appraisal ratios based on those models are systematically lower for insurance funds. In addition, insurance funds on average hold stocks with slightly higher betas; their portfolio holdings do not appear to have higher quality as measured by S&P stock rankings. In other words, insurance funds do not seem to be extra prudent in making investment decisions.

Further empirical analysis supports the agency-problem explanation. First, flows to insurance funds are always higher than flows to non-insurance funds, regardless of past performance. This is consistent with the anecdotal evidence that insurance funds put forth more efforts on distribu-

[3] For example, a research conducted by the Spectrum Group reports that only 38 percent of insurance fund investors have a four-year college degree or more vs. 50 percent for all mutual fund investors. See "Insurers Can Penetrate Retail Mutual Fund Market," National Underwriter (Life & Health/Financial Service Edition), August 9, 1999, by William White.

[4] Variable annuities are insurance products that combine features of life insurance with mutual fund-style investment accounts. According to the 2004 Annuity Fact Book published by the National Association for Variable Annuities, in 2003, 60 percent of variable annuities are sold by insurance agents, 25 percent by stock brokers, and 15 percent by banks.

[5] According to a 2003 compensation survey of investment management professionals conducted jointly by Association for Investment Management and Research (AIMR) and Russell Reynolds Associates, the pay to investment managers in insurance companies is lower than to those in investment counseling firms, security brokers, and investment companies. While there is no direct comparison of compensations between insurance mutual funds and other types of mutual funds, it is reasonable to conjecture that when a mutual fund manager also manages a large amount of insurance money, he/she is paid more like an insurance money manager than a typical mutual fund manager.

tion and marketing. Second, relative to non-insurance funds, flows to insurance funds are more sensitive to past performance if they performed well, but less sensitive to past performance if they performed poorly. We show that the low flow-performance sensitivity for those poorly performing insurance funds is neither because their performance is more difficult to measure, nor because their performance is less persistent. Rather, it is a symptom of lack of monitoring by fund investors. Finally, insurance fund flows are more responsive to raw returns but less sensitive to risk-adjusted performance measures such as the appraisal ratios, indicating that their investors are less sophisticated. Taken together, the evidence shows that the cross-selling advantage enables insurance funds to attract a group of unsophisticated investors who do not monitor fund performance closely, leaving fund managers less pressured to compete on performance. In addition, since the flow-performance relation is more convex for insurance funds, they may be motivated to make more risky investments than do non-insurance funds. This risk-taking effect may offset the prudence concern, if any, arising from their affiliation with insurers.

Finally, we analyze incentive problems across insurance funds. Using several insurer-level and fund-level variables, we characterize the cross-selling efforts by insurers and link such efforts to fund performance as well as to the degree of investor oversight. We find that funds more likely to rely on cross-selling, such as those whose insurance parents spend heavily on advertising, those directly established by insurers, and those using parents' brand names, have lower flow-performance sensitivity and worse performance relative to other insurance funds. In addition, when the asset management subsidiaries of insurers simultaneously manage mutual funds and a large amount of in-house assets, their mutual funds tend to underperform. To summarize, cross-selling leads to agency problems such as lack of investor monitoring and conflict of interests, which erode fund performance.

In a recent study, James and Karceski (2006) analyze the performance of mutual funds sold to institutional investors. They show that institutional funds subject to less investor oversight (e.g., those with low initial investment requirement and those with retail mates) tend to underperform those subject to greater investor oversight (e.g., with high initial investment requirement), and flows of the former are less sensitive to risk-adjusted performance than flows of the latter. The insurance fund sample we study is significantly different from their institutional fund sample as insurance funds mostly target individual investors.[6] James and Karceski (2006) also show that investors of institutional funds use more sophisticated measures to gauge fund performance, relative to investors of retail funds. In contrast, according to our analysis, insurance funds are at the opposite spectrum of investor sophistication relative to the institutional funds. Despite such differences, the findings in both studies suggest that underperformance due to lack of investor monitoring and ensuing agency problems may be quite universal in the fund industry.

The evidence provided by this paper should also be useful for investors and regulators to understand the full effects of financial conglomeration. Deregulation and consolidation in the financial industry over the last two decades have blurred the borders among different types of financial institutions. Some studies find evidence of synergistic gains from financial conglomeration (e.g., Houston and Ryngaert, 1994; Berger et al., 1996; Houston et al., 2001), while others point out a diversification discount for financial conglomerates (e.g., Laeven and Levine, 2006). As most of these studies focus on the costs and benefits of conglomeration from the perspective of financial institutions, less is known on the welfare of their customers when a financial

[6] In our sample, out of 327 insurance funds in 2002, 83 have institutional share classes. These institutional share classes are typically small, accounting for only 7.83% of the total net assets of insurance funds. We also observe that unlike institutional funds, most insurance funds have low minimum initial investment requirement.

institution offer products and services beyond its traditional business. In this study, we present a case that financial conglomeration actually hurts customers and show that the factors driving the synergy gains for insurers may reduce fund managers' incentive to pursue superior performance.

The remainder of this paper is organized in five sections. Section 2 provides an overview of insurance mutual funds and discusses their regulatory environment. Section 3 describes the data and the measures of fund performance. Section 4 presents empirical analysis on fund performance, risk-taking behavior, and fund flows. In Section 5, we construct several measures to quantify the cross-selling efforts within the insurance fund sector and examine how such efforts affect fund performance and flows. Finally, Section 6 provides our conclusions.

2. Background of insurance mutual funds

2.1. Insurance mutual funds

Insurance firms have been involved in the mutual fund business in multiple ways. First, many insurers directly set up their own asset management subsidiaries. Some asset management subsidiaries use their parents' brand names (e.g. Chubb Capital and State Farm), while others create new brand names (for instance, Putnam was established by insurance broker Marsh & MacLennan). Second, several large insurers have carried out a strategy of acquiring highly regarded fund management companies. The two oldest fund management companies in the US, Massachusetts Financial Service Group and State Street Research and Management, were later acquired by Sun Life and Metlife respectively. Third, some insurance firms establish partnerships with non-affiliated fund management companies. Partnership allows insurance fund management companies to sub-advise funds in other fund families or sub-contract insurance mutual funds to others. For example, Principal Financial has its in-house management companies but also contracts out some funds to external managers such as Morgan Stanley Asset Management and UBS Global Asset Management. Finally, rather than managing funds, some insurers serve as fund distributors. For example, Jefferson Pilot organizes a mutual fund "supermarket" that sells over 7000 external funds. The focus of this paper, however, is on insurers with fund management business rather than mere fund distributors.

Table 1 lists 38 insurance companies that have mutual fund management business. The procedures for identifying those insurance firms and their affiliated mutual fund management companies are described in Section 3.2. We collect the data on the characteristics of those insurers from the Mergent/Moody's Bank and Finance Manual and the A.M. Best Rating databases for property and liability insurance companies and life insurance companies. The majority of insurance companies in our list have outstanding ratings. Out of the 31 insurance firms that have A.M. Best ratings at the end of 2002, 23 firms are rated A+ or above.[7] Insurers with fund management business tend to be large, with an average market capitalization of $126 billion at the end of 2002.

Among the list of insurers with fund management business, there are 27 life insurance firms, 9 property and liability firms, and 2 insurance brokerage firms. Life insurance companies tend to position themselves as broad financial service providers, with products ranging from life insurance, long term care and annuities, to retirement and financial planning services. The similarity between life insurance products and mutual funds and their extensive distribution system would

[7] The A.M. Best rating, provided by A.B. Best Company, is a comprehensive measure of an insurer's balance sheet strength, operating performance and business profile. The rating ranges from A++ (superior) to F (in liquidation).

Table 1
Characteristics of parent insurance companies

Name	Total assets (million US$)	Major business type	A.M. Best rating[d]
Aegon N.V.	238,206	Life	A+
Aetna Inc.	40,048	Life	A-
American General Life Insurance Co.	7851[a]	Life	A+
American International Group, Inc.	561,229	P&L	A+
American National Insurance Co.	12,139	Life	A+
Aon Corporation	25,334	Broker	NA
AXA Financial Inc.	100,909	Life	A
Chubb Corporation	34,114	P&L	A++
CIGNA Corporation	88,950	Life	A-
Connecticut Mutual Life	NA	Life	NA
Equitable Life Assurance	99,796[b]	Life	A+
Fortis, Inc.	542,662	Life	NA
Guardian Life Insurance Cos. of America	16,874[b]	Life	A+
Hartford Financial Services Group, Inc.	182,043	P&L	A+
ING Groep N.V.	716,370	P&L	NA
Jefferson Pilot Corp.	30,609	Life	A++
John Hancock Financial Services Inc.	97,864	P&L	A++
Lincoln National Corporation	93,133	Life	A+
Marsh & Mclennan Companies, Inc.	13,855	Broker	NA
Massachusetts Mutual Life	84,102	Life	A++
MetLife, Inc.	277,385	Life	A+
MONY Group, Inc.	19,876	Life	A+
National Life Insurance	9355[b]	Life	A
Nationwide Financial Services, Inc.	95,560	Life	A+
New York Life Insurance Company	77,942[c]	Life	A++
Northwestern Mutual Life	102,935	Life	A++
Ohio National Life Insurance Corporation	5057[a]	Life	A+
Pacific Life Insurance Corporation	55,682	Life	A++
Principal Financial Group	89,861	Life	A+
Phoenix Companies, Inc.	25,246	Life	A++
Prudential Financial Inc.	292,746	Life	A
SAFECO Corporation	34,656	P&L	A
Skandia Insurance Company Ltd.	61,062	Life	A-
St. Paul Companies, Inc.	39,920	P&L	A
State Farm	65,816	P&L	A++
Sun Life Financial Inc.	111,515	Life	NA
Traveler, Inc./Primerica Corporation	13,694	Life	A++
Zurich Financial Services	285,856	P&L	NA
Summary			
Average Firm total assets (million US$)		125,682	
Median Firm total assets (million US$)		77,942	
Number of life insurers		27	
A.M. Best rating A+ and above		23	

Notes. This table reports the characteristics of insurers sponsoring mutual funds. Total assets, business types, and A.M. Best ratings are as of 2002, unless otherwise noted. We generate this list using the CDA/Spectrum 13F Institutional Holdings data, the Mergent/Moody's Bank and Finance Manual, and the A.M. Best rating data.

[a] Reported total assets as of 12/31/1997.

[b] Reported total assets as of 12/31/1999.

[c] Reported total assets as of 12/31/2001.

[d] Best ratings are not available (NA) for foreign insurers, insurance brokers, and terminated insurers.

strongly motivate life insurers to engage in the mutual fund business. The two insurance brokers with mutual fund business are Marsh & MacLennan and Aon. Brokers are intermediaries who represent insurance buyers to negotiate with insurance companies for price, coverage, and service. Their strong relationship with insurance buyers may offer insurance brokers an advantage in cross-selling mutual fund products.

2.2. Regulatory background for insurance asset management

Under the prudent man rule, certain types of fund managers have fiduciary duties to fund investors. Primarily due to state laws and insurance regulations, insurance firms are subject to such fiduciary duties when managing their own investments. The common law origin of the prudent man rule can be traced back to the case of Harvard College versus Amory in 1830. The old Prudent Man Rule Statute was established in 1942 and a comparable prudence standard for the administration of pension and employee benefit trusts was imposed by the Employee retirement Income Security Act (ERISA) in 1974. The old prudent man rule favors "safe" investments such as government bonds while disfavors "speculations" in stocks. Under this rule, prudence is assessed on each investment in isolation rather than in the context of the portfolio as a whole. The development in modern portfolio theory brought up attentions and criticisms to the old prudent man rule, especially its itemized approach in scrutinizing investments (e.g., Elton and Gruber, 1986). In 1994, the National Conference of Commissioners on Uniform State Laws approved the Uniform Prudent Investor Act (UPIA), which is based on a less conservative portfolio approach to regulate investments of fiduciary fund managers. The new rule applies the standard of prudence to the entire portfolio, while removing categorical restrictions on specific types of investments (Train and Melfe, 1999). States started to adopt UPIA in 1995, and by now it has been adopted by a majority of states.

It should be pointed out that mutual funds, including those affiliated with insurance firms, are subject to the Investment Company Act, but not directly subject to the Prudent Man Rule or the subsequent UPIA. The Investment Company Act does not impose fiduciary duties on fund managers, nor does it impose any categorical restrictions on investments. Nevertheless, when a fund management company manages both fiduciary assets and mutual fund assets, the prudence concern may affect the risk taking activities of the mutual funds they manage. That is, these mutual funds may be subject to a "spillover" effect of the prudence concern and similarly take a conservative approach in risk-taking.

3. Data and methodology

3.1. Data on fund returns and portfolio holdings

We use two major mutual fund databases in our analysis. The first is the CRSP survivorship-free mutual fund data (the "CRSP data"), which contains monthly returns for all US mutual funds. The second is the Thomson Financial CDA/Spectrum database (hereafter the "CDA data"), providing mutual fund portfolio holdings information at quarterly or semi-annual frequency. This data set is used in a number of previous studies, such as Daniel et al. (1997) and Wermers (2000). We combine the two data sets to obtain complete information on fund returns as well as fund portfolio holdings. Since our focus is on actively-managed US domestic equity funds, consistent with prior studies (e.g., Wermers, 2000) we include funds with the following investment objective codes (IOC): aggressive growth, growth, growth and income, and balanced. We exclude all index funds, foreign-based funds, US-based international funds, fixed-income

funds, real estate funds, and precious metal funds. We additionally exclude variable annuities that are included in the CDA data but not included in the CRSP data. A detailed description of the procedure to merge these two data sets can be found in Jiang et al. (2006).

3.2. Identifying insurance mutual funds

The CDA data set provides names of mutual fund management companies. Using a link provided by Thomson Financial, we identify those fund management companies in the Thomson Financial CDA/Spectrum 13F Institutional Holding data (the "13F data").[8] In the 13F data fund management firms are further classified into the following categories based on their ultimate ownership: (1) banks, (2) insurance companies, (3) investment companies and their managers (mutual funds), (4) independent investment advisors (consisting mainly of large brokerage firms), and (5) others (including pension funds and university endowments).[9] This enables us to identify insurance-affiliated fund management companies and the mutual funds they manage. To ensure the accuracy of insurance fund identification, for each fund management company we also look up its ownership information in Mergent/Moody's Bank and Finance Manual, which lists subsidiaries of insurance firms.

Because the link provided by Thomson Financial to match the 13F data with the CDA data can at best be traced back to 1990, and because the Mergent/Moody's Bank and Finance Manual generally provides less information about mutual fund subsidiaries of insurers in the editions prior to 1990, we focus on the sample period between January 1990 and December 2002.

3.3. Summary statistics

We provide sample descriptive statistics in Table 2. Panel A shows that the number of insurance-managed active US equity funds increases from 156 in 1990 to 327 in 2002. During the whole sample period, there are 421 unique insurance funds and 1893 unique non-insurance funds. The total net assets of insurance funds are $31.50 billion in 1990, representing about 15 percent of this market sector. In 2002, their total net assets are $330.55 billion, accounting for about 19 percent of the market.

Panel B of Table 2 describes the characteristics of insurance and non-insurance funds. The average total net assets (TNA) of insurance funds and non-insurance funds are 583.36 and 625.55 million respectively. The average turnover ratio of insurance funds is about 100 percent per year, slightly higher than the 93 percent for non-insurance funds. Insurance funds on average invest 86 percent of assets in stocks, similar to non-insurance funds. The average age of insurance funds is 14.57 years while that of non-insurance funds is 13.05 years. However, when making comparisons, one should take into account the fact that some old funds started as independent ones and were later acquired by insurance firms.

[8] All institutions with over $100 million of securities under discretionary management are required to report their holdings to SEC on a quarterly basis using SEC Form 13F. The 13F data set differs from the CDA data set in two aspects. First, the CDA data set covers mutual funds, while the 13F data set also includes other types of financial institutions. Second, the CDA data set provides holdings information at the fund level, while the 13F data set reports aggregated holdings at the management company level.

[9] Thomson Financial reports that some firms are incorrectly labeled as of type (5) in the 13F data after 1998. As a remedy, we use the pre-1998 types for those firms. If a firm that exist only after 1998 and is labeled as type (5), we obtain its ownership information by checking its website and Mergent/Moody's Bank and Finance Manual. In addition, the link between the 13F data and the CDA data is available since 1994. We extend the link back to 1990 using the post-1994 link. The validity of such extension is then manually verified using Mergent/Moody's Bank and Finance Manual.

Table 2
Summary statistics of sample funds
Panel A: Numbers and TNAs of Mutual Funds

Year	Insurance funds		Non-insurance funds	
	Number	Aggregated TNA ($billion)	Number	Aggregated TNA ($billion)
1990	156	31.50	687	172.27
1991	189	43.87	749	261.12
1992	193	54.67	899	340.23
1993	229	74.50	1060	482.41
1994	252	81.41	1300	529.82
1995	283	118.67	1402	758.83
1996	325	168.10	1572	976.32
1997	357	242.36	1698	1311.18
1998	359	311.23	1716	1606.18
1999	355	417.31	1689	1986.76
2000	349	405.95	1641	1935.29
2001	337	337.35	1565	1726.17
2002	327	330.55	1485	1408.42
1990–2002	421		1893	

Panel B: Fund Characteristics

	ALL	AGG	GRO	G&I	BAL
			Insurance Funds		
Number of funds	421	47	244	88	42
TNA ($million)	583.36	1,000.63	468.74	778.62	396.30
Longevity (years)	14.57	16.25	12.85	18.14	15.21
Turnover (%/year)	100	125	94	93	119
Investment in stocks (%)	86	92	92	86	49
Expense ratio (%/year)	1.38	1.51	1.40	1.30	1.28
12b-1 fee (%/year)	0.38	0.48	0.35	0.42	0.32
Load (%/year)	0.48	0.57	0.46	0.52	0.44
Proportion with back-end load (%)	0.50	0.63	0.45	0.49	0.45
			Non-Insurance Funds		
Number of funds	1893	204	1166	359	164
TNA ($million)	625.55	690.92	485.31	1,120.01	466.24
Longevity (years)	13.05	17.08	11.65	15.42	12.82
Turnover (%/year)	93	128	98	67	91
Investment in stocks (%)	85	92	91	85	50
Expense ratio (%/year)	1.34	1.55	1.36	1.21	1.18
12b-1 fee (%/year)	0.18	0.21	0.16	0.23	0.17
Load (%/year)	0.25	0.34	0.23	0.29	0.24
Proportion with back-end load (%)	0.27	0.39	0.21	0.30	0.19

Notes. Panel A reports the number and total net assets of insurance and non-insurance mutual funds during the sample period. Panel B reports characteristics of insurance and non-insurance mutual funds and breakdowns by their investment objectives—aggressive growth (AGG), growth (GRO), growth and income (G&I), and balanced (BAL). Total net assets (TNA), turnover, expense ratio, 12b-1 fee, and load are first averaged across time series of each fund and then averaged across funds. Longevity is the difference in the years of the funds' first and last appearance in CRSP. Load is amortized assuming a seven-year holding period.

The average annual expense ratio for insurance funds is 1.38 percent, slightly higher than the 1.34 percent for non-insurance funds. An important component of fund expenses is 12b-1 fee, a charge covering distribution and marketing expenses. The average 12b-1 fee of insurance funds is 0.38 percent, more than double the 0.18 percent for non-insurance funds. According to an Investment Company Institute survey, for mutual funds with 12b-1 fees, 63 percent of the revenue from the 12b-1 fee is used for broker–dealer compensation, 32 percent for administration services (e.g., record keeping), and 5 percent for advertising and sales promotion.[10] Higher 12b-1 fees indicate that insurance funds tend to put forth more effort in distribution than do their peers.

Moreover, the average annualized load for insurance funds is 0.48 percent, almost double that of non-insurance funds (0.25 percent). About 50 percent of insurance funds have a back-end load fund class, in comparison to the 27 percent for non-insurance funds. Back-end loads add costs for investors to redeem poorly performing funds.

3.4. Performance and flow measures

For performance measures without risk adjustment, we use net returns from the CRSP data and gross returns computed using the portfolio holdings from the CDA data. The net return is defined as the value-weighted average of returns of different share classes where the weights are proportional to total asset value of the share classes.[11] The gross return (GR) is defined as:

$$GR_t = \sum_{j=1}^{N} \omega_{j,t-1} r_{jt} \tag{1}$$

where $\omega_{j,t-1}$ is the portfolio weight of a fund on stock j at the end of quarter $t-1$, i.e. the beginning of quarter t, and r_{jt} is the buy-and-hold return of stock j in quarter t. Annual gross fund returns are computed based on the above quarterly gross returns.

We use the CAPM based one-factor model, the Fama–French (1993) three-factor model, and the Carhart (1997) four-factor model to measure risk-adjusted alphas. For each year, we measure the risk-adjusted performance using the estimated alphas from the following models:

$$R_{it} - RF_t = \alpha + \beta_i RMRF_t + e_{it}, \tag{2}$$

$$R_{it} - RF_t = \alpha + \beta_{i1} RMRF_t + \beta_{i2} SMB_t + \beta_{i3} HML_t + e_{it}, \tag{3}$$

$$R_{it} - RF_t = \alpha + \beta_{i1} RMRF_t + \beta_{i2} SMB_t + \beta_{i3} HML_t + \beta_{i4} UMD_t + e_{it}, \tag{4}$$

where $R_{it} - RF_t$ is the monthly net return of fund i in excess of the risk-free rate (the one-month US Treasury bill rate from CRSP), $RMRF_t$ is the monthly excess return on the CRSP value-weighted index, SMB_t and HML_t are Fama–French size and book-to-market factors, and UMD_t is the 12-month momentum factor.[12]

We also use the appraisal ratio of Treynor and Black (1973) to evaluate risk-adjusted performance. The appraisal ratio is the estimated alpha divided by the standard deviation of the residuals from the above multi-factor regressions. Relative to Jensen's alpha, the appraisal ratio takes into account the tracking error of a fund.

[10] See Investment Company Institute (ICI)'s Perspective, July 2003, page 19.

[11] The CRSP data set reports returns for each share class of the same fund. However, the CDA data set does not separately report portfolio holdings for each share class. When analyzing fund returns, we aggregate various share classes into a single fund.

[12] We obtain data on SMB_t, HML_t, and UMD_t from Ken French's website.

After obtaining the annual returns and alphas for individual funds, we compute the average returns and alphas for insurance and non-insurance funds in each year and during the full sample period. In the by-year analysis, the average performance measures are the TNA-weighted averages of those performance measures for individual funds. To obtain the full-sample performance, the time-series means of the year-by-year average performance measures are computed. The time-series t-statistics are obtained using the Newey–West (1987) heteroskedasticity- and autocorrelation-consistent covariance estimator with a lag of order one.

Following the exiting literature (e.g. Sirri and Tufano, 1998), we measure mutual fund flow (FLOW) as:

$$FLOW_{it} = \frac{TNA_{it} - TNA_{it-1}(1 + R_{it})}{TNA_{it-1}} \tag{5}$$

where TNA_{it} is the total net assets at the end of year, and R_{it} is the fund return during the year.

4. Performance, risk-taking, and fund flows

4.1. Fund performance

Panel A of Table 3 provides a comparison of the performance of insurance and non-insurance funds using performance measures without risk adjustment. In each year, we compute the TNA-weighted average of net returns, IOC&TNA-adjusted returns, and gross returns for insurance funds and non-insurance funds separately. Out of 13 sample years, TNA-weighted average net returns of insurance funds are lower than those of non-insurance funds for 10 years. During the entire sample period, the average annual net return of insurance funds is 10.24 percent and that of non-insurance funds is 11.81 percent. The difference is −1.63 percent, with a Newey–West t-statistics of −2.06, indicating significant underperformance by insurance funds.

Since fund performance may be affected by investment objectives (IOC) and fund size (TNA), to facilitate performance comparison we also calculate IOC&TNA-adjusted net returns for insurance funds. Each insurance fund is matched with a group of non-insurance funds with the same CDA investment objective code (IOC) and with TNA between 70 percent and 130 percent of that of the insurance fund. On average, an insurance fund is matched with 19 non-insurance funds (with a minimum of 5 and a maximum of 86). The IOC&TNA-adjusted return is then the net return of an insurance fund in excess of the average net return of the matched funds. Averaged over the 13 sample years, the IOC&TNA-adjusted return of insurance funds is −1.32 percent per year, with a Newey–West t statistic of −1.91.

The results based on gross returns are similar. In each year we compute the TNA-weighted average gross returns for insurance funds and non-insurance funds separately. In terms of the gross return measure, insurance funds underperform other funds for 10 out of 13 years. Averaged over sample years, the gross return of insurance funds is lower than that of non-insurance funds by 1.23 percent, with a t-statistics of −2.28. Since gross returns are calculated before fund expenses and transaction costs, the underperformance of insurance funds cannot be attributed to differences in transaction costs or expenses. In addition, Table 2 also suggests that the difference in expense ratio between insurance and non-insurance funds is small.

Next, we examine risk-adjusted performance. According to the prudent man hypothesis, risk-adjusted performance of insurance funds should be similar to that of non-insurance funds, while the agency problem hypothesis predicts lower risk-adjusted performance by insurance funds. In panel B of Table 3, we report TNA-weighted annual alphas of insurance and non-insurance funds.

Fund alphas are estimated in each year using the one-factor, three-factor, and four-factor models separately. Over the entire sample period, the alpha for insurance funds is lower by 0.85 percent, 0.90 percent, and 1.43 percent per year under the three different models. Their corresponding t-statistics are significant at the 5 percent level. In panel C, we report the results for appraisal ratios. The appraisal ratio is calculated for each fund in each year, under the three different models. We then take the TNA-weighted average of appraisal ratios for insurance and non-insurance funds. Averaged across sample years, the appraisal ratios for insurance funds are substantially lower than those of non-insurance funds. These results are consistent with the agency problem hypothesis and inconsistent with the prudent man hypothesis.

Table 3
Fund performance comparison
Panel A. Net Return and Gross Return

Year	Net return (%/year)				Gross return (%/year)		
	insurance	others	difference	IOC&TNA-adj.	insurance	others	difference
1990	−3.21	−5.35	2.14	1.36	−3.12	−4.93	1.72
1991	31.23	34.91	−3.75	−1.54	34.90	38.21	−3.21
1992	8.12	9.21	−1.12	−1.41	8.23	10.35	−2.14
1993	13.87	15.96	−2.14	−0.92	13.15	16.12	−3.04
1994	−2.20	−1.02	−1.21	−2.21	−2.05	−0.51	−1.51
1995	32.22	31.41	0.85	1.02	37.72	37.26	0.59
1996	17.45	18.32	−0.90	−0.73	21.04	21.93	−0.91
1997	23.91	25.17	−1.22	−0.00	28.40	29.92	−1.52
1998	19.60	20.35	−0.71	2.41	21.54	22.25	−0.75
1999	31.52	29.72	1.86	1.46	35.81	28.40	7.43
2000	−5.51	−1.43	−4.04	−2.93	−6.41	−3.42	−3.03
2001	−14.93	−8.87	−6.82	−6.05	−17.53	−12.03	−5.56
2002	−22.71	−17.65	−5.15	−5.72	−24.62	−21.55	−3.12
1990–2002	10.24	11.81	−1.63	−1.32	11.65	12.80	−1.23
(t-stat.)			(−2.06)	(−1.91)			(−2.28)

Panel B. Alphas

Year	1-factor alpha (%/year)			3-factor alpha (%/year)			4-factor alpha (%/year)		
	insurance	others	difference	insurance	others	difference	insurance	others	difference
1990	0.34	−2.01	2.36	−1.02	−1.28	0.24	−1.22	−1.06	−0.20
1991	0.21	1.25	−1.03	−0.34	0.46	−0.71	−0.54	0.83	−1.37
1992	−0.55	0.00	−0.51	1.62	0.91	0.77	1.46	1.20	0.22
1993	2.31	3.63	−1.30	3.37	3.75	−0.43	2.73	4.04	−1.35
1994	−2.50	−1.32	−1.23	−2.45	−1.13	−1.35	−2.71	−1.32	−1.41
1995	−2.84	−1.91	−0.95	−1.80	−1.61	−0.24	−2.26	−2.04	−0.21
1996	−2.92	−2.15	−0.82	−2.51	−2.11	−0.41	−2.72	−2.21	−0.64
1997	−5.27	−3.17	−1.81	−3.13	−2.95	−0.26	−3.71	−3.66	−0.15
1998	−3.86	−2.62	−1.24	−2.62	−1.26	−1.43	−3.27	−1.82	−1.43
1999	−0.82	−1.61	0.82	−3.51	−2.33	−1.25	−5.22	−3.53	−1.71
2000	4.70	7.23	−2.52	12.14	12.13	−0.00	6.95	10.41	−3.55
2001	−6.02	−1.62	−4.41	−6.53	−2.81	−3.74	−6.53	−2.80	−3.73
2002	−5.03	−2.45	−2.64	−5.02	−2.05	−3.02	−5.31	−2.02	−3.36
1990–2002	−1.62	−0.83	−0.85	−0.90	−0.00	−0.90	−1.65	−0.22	−1.43
(t-stat.)			(−2.58)			(−2.52)			(−3.81)

Table 3 (*continued*)

Panel C. Appraisal Ratios

Year	1-factor appraisal ratio			3-factor appraisal ratio			4-factor appraisal ratio		
	insurance	others	difference	insurance	others	difference	insurance	others	difference
1990	0.35	−3.81	4.12	−0.75	−1.17	0.46	−0.93	−1.01	0.15
1991	−0.72	0.66	−1.33	−0.62	0.43	−1.02	−1.02	0.82	−1.81
1992	−0.32	0.25	−0.51	0.61	0.61	0.01	0.65	1.15	−0.50
1993	2.16	3.30	−1.26	2.95	3.35	−0.44	2.71	4.32	−1.65
1994	−2.57	−1.16	−1.43	−2.82	−1.22	−1.62	−3.26	−1.16	−2.13
1995	−0.90	−1.05	0.11	−1.31	−1.51	0.26	−1.94	−1.90	−0.02
1996	−1.31	−1.51	0.27	−2.02	−1.67	−0.45	−2.33	−1.71	−0.64
1997	−2.63	−1.04	−1.60	−3.84	−2.64	−1.23	−4.37	−3.04	−1.33
1998	−2.62	−1.44	−1.22	−3.55	−2.62	−0.92	−3.85	−2.42	−1.46
1999	−3.22	−3.62	0.42	−4.21	−3.64	−0.66	−5.32	−4.11	−1.25
2000	2.61	4.20	−1.61	5.84	6.24	−0.45	4.33	6.36	−2.04
2001	−2.20	−0.71	−1.55	−2.82	−0.72	−2.15	−3.13	−0.81	−2.36
2002	−1.83	−1.15	−0.72	−2.36	−1.16	−1.22	−2.54	−1.00	−1.52
1990–2002	−1.05	−0.53	−0.52	−1.14	−0.46	−0.74	−1.55	−0.22	−1.35
(*t*-stat.)			(−1.13)			(−3.58)			(−5.90)

Notes. This table reports performance of insurance funds and non-insurance funds (others) by year and over the full sample period. Panel A reports fund net returns, IOC&TNA-adjusted returns, and gross returns. IOC&TNA-adjusted return is the net return of insurance funds in excess of the average net return of matched non-insurance funds with the same investment objective and with TNAs between 70 and 130% of that of the insurance fund. Gross return is the hypothetical buy-and-hold return based on beginning-of-quarter holdings. Panel B reports fund alphas. We use the one-factor model, three-factor model, and four-factor model to estimate the alphas in each year. Panel C reports the appraisal ratios, which are the estimated alphas divided by the standard deviations of regression residuals from the corresponding factor models. In each year, we report the TNA-weighted averages of annual performance measures for insurance and non-insurance funds, and the performance difference between the two groups. We also report the time-series averages of performance measures for insurance and other funds for the full sample period. The Newey–West *t*-statistics are in the parentheses.

Table 3 reveals two additional patterns that are worth noting. First, the underperformance of insurance funds appears to be more severe during later sample years, which coincides with the regulatory change regarding the prudent man rule. Second, the underperformance of insurance funds also appears to be more significant during years of market downturns. In Table 4, we perform further analysis to examine the significance of these two patterns. We use a panel regression approach instead of the Fama–MacBeth (1973) procedure to make inference, since the latter does not provide sufficient statistical power given the short time length of subperiods involved. Specifically, we create two dummy variables related to the repeal of the traditional prudent man rule and market downturns: REPEAL and MKTDOWN. REPEAL equals one if the sample year is after 1995, the first year when states start to adopt UPIA, and zero otherwise. MKTDOWN equals one if the annual market return during a sample year is below the median market return of the entire sample period. Further, we create a dummy INS, which equals one if the fund is an insurance fund and zero otherwise. We then regress one of the annual performance measures across sample funds onto REPEAL, INS, as well as the product term INS∗REPEAL. To control for fund-specific variations in performance, we include a fixed fund effect in the panel regression. Fund performance measures include annual net return, annual 4-factor alpha, and annual 4-factor appraisal ratio. Similarly, we perform panel regressions of fund performance measure onto MKTDOWN, INS, and the product term INS∗MKTDOWN, with the fund-level fixed effect.

Table 4
Fund performance comparison: further analysis

	Net return	4-factor alpha	4-factor appraisal ratio
	Panel A. Fund Performance before and after 1995		
INTERCEPT	0.09	−0.00	0.03
	(0.83)	(−0.04)	(0.11)
INS	−0.02	−0.01	−0.04
	(−1.99)	(−2.54)	(−2.19)
REPEAL	−0.05	−0.01	−0.03
	(−13.22)	(−2.91)	(−2.62)
INS ∗ REPEAL	−0.02	−0.01	−0.07
	(−2.07)	(−2.08)	(−2.81)
	Panel B. Fund Performance Under Good and Poor Market Conditions		
INTERCEPT	0.12	−0.01	−0.01
	(1.11)	(−0.21)	(−0.04)
INS	−0.01	−0.01	−0.05
	(−2.35)	(−2.63)	(−1.91)
MKTDOWN	−0.10	−0.04	−0.13
	(−27.51)	(−17.47)	(−15.93)
INS ∗ MKTDOWN	−0.01	−0.01	−0.04
	(−2.34)	(−2.51)	(−2.10)

Notes. This table reports the results from panel regressions on alternative fund performance measures, including fund net returns, 4-factor alphas, and 4-factor appraisal ratios. In panel A, explanatory variables include an insurance dummy INS, a REPEAL dummy indicating the period after 1995, and the product term of INS and REPEAL. In panel B, explanatory variables include INS, a MKTDOWN dummy indicating poor market conditions, and the product term of INS and MKTDOWN. For both regressions, we use fixed fund effect to control for fund-specific variations. The *t*-statistics are in the parentheses.

As reported in panel A of the table, the coefficient for INS is significantly negative, indicating underperformance by insurance funds. In addition, the coefficient for INS ∗ REPEAL is also significantly negative, suggesting that after the repeal of the traditional prudent man rule insurance funds experience even more severe underperformance. In panel B, the coefficient for INS is again significantly negative. Further, the coefficient for INS ∗ MKTDOWN is also significantly negative, showing that insurance funds do worse under poor market conditions. It should be pointed out that the two dummy variables are correlated as the period from 2000 to 2002 happens to be after the repeal of the old prudent man rule and of poor market conditions. We do not further differentiate these two scenarios, but note that in either case the results are inconsistent with the prudent man hypothesis. If the underperformance of insurance funds is due to prudence concern, insurance funds would have done better after the repeal of the prudence man law. The extra poor performance of insurance funds under poor market conditions also suggests possibly higher downside risk for these funds, inconsistent with conservatism in risk taking.

4.2. Risk-taking behavior

The factor models we use to compute alphas may not capture all possible risks mutual funds take. In this section, we provide additional analysis on the risk-taking behavior of insurance funds based on their portfolio characteristics. Insurance mutual funds are subject to the same regulatory constraints as other funds. Thus, we test if the prudence concern of parent insurance companies leads insurance funds to hold less risky securities. Specifically, we analyze the following characteristics of fund portfolio holdings:

(1) The weighted-average fund beta $\beta = \sum_{i=1}^{N} \omega_i \beta_i$, where β_i is the beta of security i and ω_i is its weight in the portfolio.[13]
(2) The portfolio weight in the two industries with the highest industry betas: the telecommunication industry and the business equipment industry.[14]
(3) The portfolio weight in stocks with better than "above average" rankings by Standard & Poor.[15]
(4) The ω_i-weighted average market capitalization of stocks in the portfolio.
(5) The ω_i-weighted average book-to-market ratios of stocks in the portfolio.
(6) The ω_i-weighted average debt/equity ratio of stocks in the portfolio.
(7) The ω_i-weighted average liquidity, where the liquidity of a stock is its annual turnover.
(8) The number of stocks held by a fund.
(9) The industry concentration of a fund as measured by the Herfindahl index: $HI = \sum_{k=1}^{K} (\omega_k)^2$, where ω_k is the weight of industry i in the portfolio.

These measures are used in existing studies that examine institutional and mutual fund portfolio holdings (Badrinath et al., 1989; Badrinath et al., 1996; Falkenstein, 1996; Gompers and Metrick, 2001; Kacperczyk et al., 2005). Characteristics (1) to (6) are related to risk and other firm characteristics of fund holdings, (7) measures fund liquidity, and the last two measure the level of diversification. We calculate the average characteristic measures by first averaging across funds in a given quarter and then averaging across time series. The results are presented in Table 5.

The table shows that insurance funds actually take on more systematic risks. Contrary to the prudent man hypothesis, the average fund beta for insurance funds (0.87) is higher than that for non-insurance funds (0.80). Insurance funds also have slightly higher portfolio weights in the two most risky industries: telecommunication and business equipment. Between insurance and non-insurance funds, there is not much difference in the quality of stock holdings as measured by S&P stock rankings, in the average market capitalization, in the average leverage ratios, or in the average liquidity. The average book-to-market ratio of stock holdings is slightly lower for insurance funds, but the difference is not statistically significant. Further, we examine whether insurance funds hold more diversified portfolios. We find that insurance funds actually hold fewer stocks, therefore are potentially less diversified. The average Herfindahl index of industry concentration, on the other hand, is similar for insurance funds and non-insurance funds.

In sum, the evidence from portfolio characteristics does not support the view that insurance funds operate in a more conservative manner. Insurance funds do not invest in more liquid and better quality assets or seek more diversification for their portfolios. Surprisingly, they take on more systematic risks by investing more in high beta securities.

[13] The individual stock betas are calculated using trailing 12-month of daily returns and we require a stock to have at least 45 days of data. To take into account the effect of nonsynchronous trading we use Dimson's (1979) beta by incorporating the coefficients on five leads and five lags of market returns. For a small number of stocks that have insufficient data to estimate betas (less than 4 percent of fund-stock-quarter observations), we assume that they have a beta of 1. Betas of non-equity assets are assumed to be 0.

[14] We follow the 12-industry classification provided by Ken French on his website and use the monthly value-weighted industry portfolio returns to estimate industry betas. The telecommunication and business equipment industries are found to have the highest betas during our sample period.

[15] S&P assigns rankings for stocks based on earnings and dividend history. S&P rankings include (1) A+ (highest), (2) A (high), (3) A- (above average), (4) B+ (average), (5) B (below average), (6) B- (lower), (7) C (lowest), (8) D (in reorganization), and (9) LIQ (liquidation). Badrinath et al. (1989) use this ranking as a measure of investment prudence.

Table 5
Portfolio characteristics

	Insurance	Others	Difference
Fund beta	0.87	0.80	0.07 (6.12)
Portfolio weight in risky industries	0.26	0.24	0.02 (1.43)
Weights in high S&P ranking stocks	0.40	0.40	0.00 (0.45)
Firm size (million $)	17.20	15.60	1.60 (0.72)
Leverage	0.32	0.32	0.00 (0.84)
Book-to-market ratio	0.51	0.53	−0.02 (−1.63)
Stock liquidity	15.57	15.25	0.32 (0.33)
Number of stocks	99.55	108.01	−8.46 (−2.59)
Industry concentration	0.03	0.03	0.00 (0.84)

Notes. This table reports portfolio characteristics of insurance funds and non-insurance funds (others). Portfolio characteristics are first averaged across funds and then averaged over time series. Fund beta is the weighted-average beta of securities held by a fund. Portfolio weight in most risky industries is the percentage of the value of stock holdings in the business equipment industry and the telephone and television transmission industry. Stocks with high S&P rankings refer to those with S&P rankings of or above A-. Firm size is the weighted-average market cap (in June of the holding year) of stocks held by a fund. Leverage is the weighted-average ratio of book value of long-term debt to the total assets of stocks held by a fund. Book-to-market ratio is the weighted-average ratio of book value of equity to the market capitalization of stocks held by a fund. Stock liquidity is the weighted-average turnover of stocks held by a fund. The weights used to calculate average beta, size, leverage, book-to-market ratio, and liquidity are the portfolio weights at the beginning of the holding year. Number of stocks is the number of stocks in a fund at the end of each year. Industry concentration of a fund is measured by the Herfindahl index. The Newey–West t-statistics are in the parentheses.

4.3. Fund flows

Our results so far are not consistent with the prudent man hypothesis. We now examine the agency problem hypothesis by analyzing fund flows. Since fund flows can be at least partially explained by investors' response to fund performance, patterns in fund flows reveal how closely investors monitor performance.

Recall that when analyzing fund performance, we aggregate different share classes into a single fund when analyzing fund performance, the fund flow analysis is conducted at the share class level. Fund flows evaluated at the share class level more accurately reflect normal changes to fund assets because they are not affected by exogenous events such as the initiation and termination of a share class.

4.3.1. Flow-performance sensitivity

At the end of each year, we sort funds into quintiles based on their prior one-year net returns, four-factor alphas, and four-factor appraisal ratios. To control for the effect of investment styles on fund performance, the performance ranks are constructed within each CDA investment objective. We then pool together all funds with the same quintile ranking into a group, regardless of their different investment objectives. Next, we calculate the TNA-weighted average fund flows in the next year for each performance quintile. Finally, we compute the time-series average of the annual TNA-weighted fund flows in each performance quintile and across all quintiles. The results are reported in panel A of Table 6.

Irrespective of the performance measure used to rank funds, the average flow to insurance funds is greater than that to non-insurance funds at almost every performance quintile. Aggregating across performance quintiles, the flow to insurance funds is 7.48 percent while that to

non-insurance funds is 4.18 percent when performance is measured using past one-year net returns. The evidence is consistent with the distributional advantage of insurance funds.

Further, panel A reveals a nonlinear relationship between fund flows and past performance. For example, when we use the one-year net return as the performance measure, the difference in fund flows between the two best-performing groups (quintiles 5 and 4) for insurance funds is 20.22 percent while the difference between quintiles 2 and 1 is 3.35 percent. The nonlinear relation between fund flow and past performance becomes more obvious in Fig. 1 where we plot the average fund flow across fund deciles ranked by prior one-year net returns. The flow-performance relation is convex for both insurance and non-insurance funds. The convex pattern is consistent with the findings in prior studies (e.g. Chevalier and Ellison, 1997; Sirri and Tufano, 1998). However, what is new here is that the flow-performance relationship for insurance funds is more convex—insurance fund flow is less responsive to performance than non-insurance funds when funds perform poorly in the prior year but it becomes more responsive to performance when funds perform well. We obtain a similar pattern when plotting average fund flows across fund deciles ranked by prior one-year four-factor alphas or four-factor appraisal ratios.

Further, we perform Fama–MacBeth regressions to assess the effect of performance on fund flow while controlling for other factors that may affect fund flows. Following Sirri and Tufano (1998) and James and Karceski (2006), we use a piecewise linear regression approach. In each year, we obtain the cross-sectional percentile ranks (PERF) for sample mutual funds based on a performance measure. We then transform PERF into five quintile performance variables, PERF_i:

$$\begin{aligned}
\mathrm{PERF}_1 &= \min[\mathrm{PERF}, 0.2],\\
\mathrm{PERF}_2 &= \min[\mathrm{PERF} - \mathrm{PERF}_1, 0.2],\\
\mathrm{PERF}_3 &= \min[\mathrm{PERF} - \mathrm{PERF}_1 - \mathrm{PERF}_2, 0.2],\\
\mathrm{PERF}_4 &= \min[\mathrm{PERF} - \mathrm{PERF}_1 - \mathrm{PERF}_2 - \mathrm{PERF}_3, 0.2],\\
\mathrm{PERF}_5 &= \min[\mathrm{PERF} - \mathrm{PERF}_1 - \mathrm{PERF}_2 - \mathrm{PERF}_3 - \mathrm{PERF}_4, 0.2]. \qquad (6)
\end{aligned}$$

In each year, we regress fund flows cross-sectionally onto prior year's five quintile performance measures (PERF_i, $i = 1, \ldots, 5$), the product term of PERF_i and the insurance dummy INS (1 for insurance fund and 0 otherwise), as well as the following control variables:

(a) SIZE, the logarithm of total net assets at the end of the previous year,
(b) STD, the standard deviation of monthly fund net returns in the previous year,

Table 6
Flow-performance relation
Panel A. Fund Flows by Performance Quintiles

	Performance ranked by								
	Net return			4-factor alpha			4-factor appraisal ratio		
	insurance	others	difference	insurance	others	difference	insurance	others	difference
Q1 (L)	−8.10	−10.54	2.44 (2.00)	−2.57	−5.93	3.36 (2.04)	−3.80	−5.36	1.56 (1.73)
Q2	−4.75	−3.32	−1.42 (−0.68)	−1.79	0.15	−1.94 (1.58)	0.41	−0.90	1.31 (1.23)
Q3	4.79	1.65	3.14 (1.53)	5.67	4.87	0.80 (0.57)	5.00	5.78	−0.78 (−0.35)
Q4	12.84	8.02	4.82 (1.84)	15.47	8.22	7.25 (2.30)	15.52	8.63	6.89 (2.11)
Q5 (H)	33.06	23.60	9.46 (1.83)	26.06	17.89	8.18 (1.68)	22.58	16.04	6.54 (1.71)
All	7.48	4.18	3.30 (2.50)	8.62	5.04	3.58 (2.70)	8.25	4.99	3.26 (2.70)

(*continued on next page*)

Table 6 (*continued*)
Panel B. Flow-Performance Sensitivity

	Performance ranked by		
	Net return	4-factor alpha	4-factor appraisal ratio
Intercept	0.64	0.70	0.70
	(3.33)	(4.02)	(8.27)
$PERF_1$	1.13	0.86	0.81
	(4.71)	(2.96)	(2.15)
$PERF_1 * INS$	−0.38	−0.42	−0.34
	(−1.97)	(−2.27)	(−2.29)
$PERF_2$	0.25	0.66	0.35
	(1.81)	(2.67)	(2.77)
$PERF_2 * INS$	0.23	−0.34	−0.27
	(0.74)	(−1.92)	(−1.54)
$PERF_3$	0.52	0.36	0.49
	(5.77)	(2.00)	(5.22)
$PERF_3 * INS$	0.27	0.06	0.09
	(1.64)	(0.26)	(0.43)
$PERF_4$	1.07	0.84	0.94
	(4.58)	(2.13)	(2.43)
$PERF_4 * INS$	0.23	0.15	0.31
	(0.51)	(1.30)	(0.97)
$PERF_5$	2.75	3.11	2.46
	(5.27)	(6.82)	(7.21)
$PERF_5 * INS$	0.71	0.86	0.76
	(2.35)	(2.54)	(2.03)
SIZE	−0.14	−0.13	−0.13
	(−10.63)	(−9.82)	(−9.78)
STD	−0.95	−0.94	1.61
	(−1.00)	(−0.70)	(1.15)
FEE	−6.24	−6.49	−6.59
	(−4.60)	(−4.38)	(−4.52)
BKLOAD	0.05	0.05	0.05
	(3.85)	(3.73)	(3.87)

Notes. Panel A reports the average fund flows at each performance quintile and across all performance quintiles. Insurance funds and non-insurance funds (others) are jointly ranked into quintiles within same IOCs based on their prior one-year net returns, prior one-year four-factor alphas, or prior one-year appraisal ratios under the four-factor model. Q1 Funds are those in the lowest performance quintile and Q5 funds are those in the highest performance quintile. Fund flows are averaged across funds using TNAs as weights in each year and then averaged over time. Panel B reports the time-series averages of coefficients of the following annual cross-sectional regression:

$$\mathrm{FLOW}_t = \alpha + \sum_{i=1}^{5}(\beta_i \mathrm{PERF}_{i,t-1} + \gamma_i \mathrm{PERF}_{i,t-1}\mathrm{INS}) + \theta_1 \mathrm{SIZE}_{t-1} + \theta_2 \mathrm{STD}_{t-1} + \theta_3 \mathrm{FEE}_{t-1} + \theta_4 \mathrm{BKLOAD}_{t-1} + e_t$$

where PERF_i is the piecewise linear transformation of the percentile rank of fund performance; INS is an insurance-fund dummy variable; SIZE is the logarithm of a fund's TNA at the end of the previous year; STD is the standard deviation of fund monthly returns during the previous year; FEE is the expense ratio plus amortized load, for the past year; and BKLOAD is the back-end load in the past year. Reported in separate columns, fund performance is alternatively measured by funds' net returns, four-factor alphas, and four-factor appraisal ratios. The Newey–West t-statistics are in the parentheses.

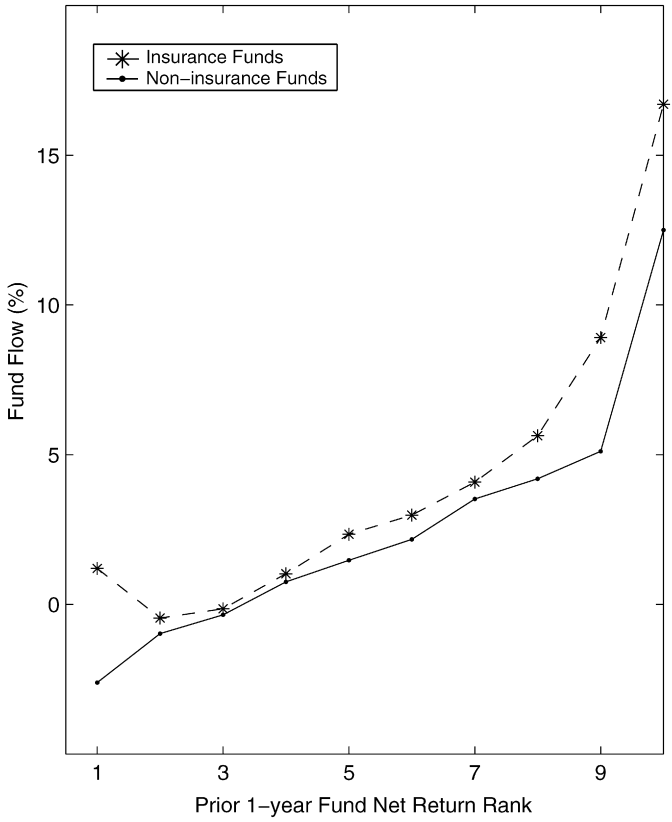

Fig. 1. Fund flows and relative performance. Insurance and non-insurance funds with the same investment objectives are ranked into deciles based on their prior one-year net returns in each year. We calculate the TNA-weighted average fund flows for each decile of insurance and non-insurance funds and average them over time series. The dotted line is the average fund flows for insurance funds. The solid line is the average fund flows for non-insurance funds.

(c) FEE, the sum of the fund annual expense ratio (EXPENSE) and the amortized fund load (TOTLOAD) over a seven-year holding period, for the prior year. That is, FEE = EXPENSE + 1/7 ∗ TOTLOAD, and
(d) BKLOAD, the back-end load charged by a fund in the prior year.

SIZE, STD, and FEE are typical explanatory variables in studies of flow-performance relationship; see, e.g, Sirri and Tufano (1998). We include back-end load as an additional control variable because it may have an effect on the cash outflows of a fund that is not completely captured by FEE. We report the averages of annual coefficients and time series t-statistics in panel B of Table 6, where prior 1-year net returns, four-factor alphas, and four-factor appraisal ratios are used as fund performance measures.

When we use the prior 1-year net return as the performance measure, the average coefficient for PERF_1 (the bottom performance quintile) is 1.13 ($t = 4.71$) while that for $\text{PERF}_1 * \text{INS}$ is -0.38 ($t = -1.97$). This indicates that insurance fund flows are less sensitive to past excess returns than non-insurance fund flows when they perform poorly. This relationship is reversed for top quintile funds, where the average coefficient for PERF_5 is 2.75 ($t = 5.27$) and that for the

$PERF_5 * INS$ is 0.71 ($t = 2.35$). There are similar patterns in the flow-performance sensitivity across performance groups when we use other performance measures.

How do we interpret the difference in the flow-performance sensitivity between insurance and non-insurance funds, particularly for those funds that have poor performance? Recall that a substantially higher proportion of insurance funds charge back-end loads (Table 2), making it costly for investors to exit these funds. However, the lower flow-performance sensitivity for poorly performing insurance funds reported in Table 6 is not merely due to this factor, since back-end load is already controlled for in the analysis. Our view is that the flow-performance sensitivity is related to the monitoring effort by fund investors, and high flow-performance sensitivity puts pressure on fund managers to improve performance. Under this view, the evidence can be interpreted as the lack of investor oversight on poorly performing insurance funds.

4.3.2. Alternative interpretations of flow-performance sensitivity

The effect of investor monitoring, however, is not the only explanation of the flow-performance sensitivity. There are several alternative interpretations. First, a somewhat extreme view is that there is no difference in the ability of fund managers and, therefore, the phenomenon of fund flow chasing performance merely reflects investor irrationality. Second, as argued by Berk and Green (2004), fund managers do have differential ability and the flow-performance sensitivity reflects investors' rational learning about managerial ability. Under this view, the flow-performance sensitivity is determined by how informative past performance is as an indicator of managerial ability. Everything else the same, if the performance of a fund is noisier, its fund flow may be less sensitive to performance. Finally, as Lynch and Musto (2003) point out, poorly performing funds are more likely to change managers or switch strategies. Therefore bad performance is less persistent and the fund flows should be less sensitive to past performance.

We argue that only the monitoring explanation can consistently explain the difference in the flow-performance sensitivity between insurance funds and non-insurance funds with similarly poor performance. The first alternative hypothesis is unlikely to hold since it is not consistent with the fact that insurance funds persistently underperform non-insurance funds. In Table 7, we report the results of several tests that rule out the other two hypotheses.

To rule out the second alternative explanation, we compare the noisiness in performance measures across funds, where the noisiness is measured by the standard deviation of the monthly fund returns during the performance-ranking year. Panel A of Table 7 reports the average standard deviations of fund net returns over the performance ranking year for each performance quintile. The return standard deviation of the poorly performing (Q1) insurance funds is slightly lower than that of non-insurance funds in the same performance rank (4.43 percent versus 4.56 percent). Therefore past returns of poorly performing insurance funds are no less informative of fund managers' ability than those of non-insurance funds. We also compare the standard deviations of estimated Jensen's alphas and appraisal ratios and reach the same conclusion. Those results are not reported here for brevity purpose.

We perform two tests to rule out the third alternative explanation. The tests examine whether poorly performing insurance funds have higher management turnovers and whether their performance is less persistent due to strategy switching. Panel B of Table 7 compares management turnovers in insurance and non-insurance funds, where the management change date is obtained from the CRSP mutual fund data. Management change (MGRCG) is 1 if the most recent manager change date recorded on CRSP in the year following the ranking period, and 0 otherwise. Our results show that Q1 insurance funds are not more likely to replace their managers than Q1 non-insurance funds. Further, panel C reports that the post-ranking one-year average return of Q1

Table 7
Fund return volatility, management turnover, and return persistence

	Q1 (L)	Q2	Q3	Q4	Q5 (H)
			Panel A: Fund Performance Volatility (%/month)		
INSURANCE	4.43	4.03	4.17	4.10	4.70
OTHERS	4.56	4.02	3.96	4.01	4.43
DIFFERENCE	−0.13	0.01	0.21	0.09	0.27
	(−1.38)	(0.19)	(2.59)	(1.38)	(3.60)
			Panel B: Management Turnover (%/quarter)		
INSURANCE	3.97	4.87	3.60	3.06	2.55
OTHERS	3.87	3.41	2.53	1.92	2.69
DIFFERENCE	0.10	1.46	1.07	1.06	−0.14
	(0.08)	(1.43)	(0.86)	(1.44)	(−0.15)
			Panel C: Return in the Subsequent Year (%/month)		
INSURANCE	1.09	1.15	1.17	1.49	1.48
OTHERS	1.15	1.24	1.27	1.39	1.44
DIFFERENCE	−0.06	−0.09	−0.10	0.10	0.04
	(−1.36)	(−3.63)	(−4.01)	(1.16)	(0.80)

Notes. This table reports the average fund return volatility, management turnover, and return persistence at each performance quintile. Insurance funds and non-insurance funds (others) are jointly ranked into quintiles based on their prior one-year net returns. Q1 Funds are those in the lowest performance quintile and Q5 funds are those in the highest performance quintile. In panel A, fund return volatility is the standard deviation of monthly fund returns during the ranking period. In panel B, management turnover is the mean of management change (MGRCG) where MGRCG is one if the most recent manager change date recorded on CRSP is in the year following the ranking period and zero otherwise. Panel C reports the average monthly fund return in the subsequent year for each quintile. The measures are first averaged across funds and then averaged over time series. The Newey–West t-statistics are in the parentheses.

insurance funds is only slightly lower than that of Q1 non-insurance funds.[16] A similar pattern is also revealed in Fig. 2, the contingency tables of the probability of subsequent performance ranking conditional on prior performance rankings. For funds initially belonging to Q1, 32 percent of insurance funds stay in Q1 in the next year while only 28 percent of Q1 non-insurance funds stay in Q1 in the next year. Therefore, there is more persistence for the poorly-performing insurance funds than for the non-insurance funds with similar performance.

Summing up the evidence in Section 4.3, we find that overall insurance funds are able to attract higher fund flows, consistent with their distributional advantages. Further, relative to non-insurance funds, insurance funds have lower flow-performance sensitivity when they perform poorly, but higher flow-performance sensitivity when they perform well. The difference in flow-performance sensitivity between insurance and non-insurance funds cannot be explained by investor irrationality, noisiness in performance measures, or difference in performance persistence; rather it reflects different degrees of monitoring efforts by fund investors, consistent with the agency problem hypothesis. The extra convex flow-performance relationship for insurance funds has an additional implication on fund incentives. Since their objective is to maximize revenue through maximizing fund flows, insurance fund managers face an option-like payoff due to the convex flow-performance relationship. This may drive them to make more risky investment decisions and offset any conservatism they may have due to their affiliations with insurance par-

[16] The results are for the period of 1990–2000. We use this period because we find no evidence of persistent fund performance during the entire sample period.

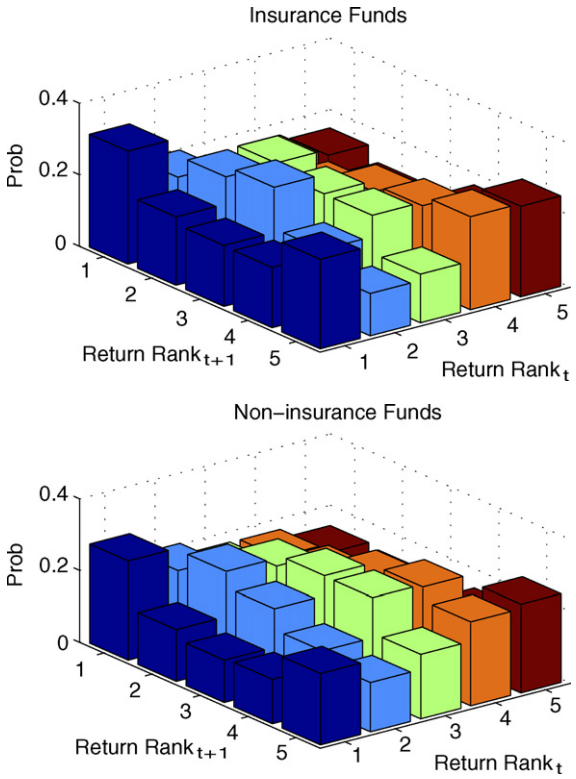

Fig. 2. Initial and subsequent one-year net return rankings. Insurance and non-insurance funds are jointly ranked into quintiles based on their one-year annual net returns in each year. We plot the probability of a fund's ranking conditional on its ranking in the previous year.

ent firms. In fact, this is consistent with our findings that insurance funds sometimes act more aggressively than non-insurance funds in risk taking, as reported in Table 5.

4.4. Investor sophistication

The above evidence on the flow-performance relationship gives rise to a further question: why do investors of poorly performing insurance funds monitor less? It is possible that the dollar value typically invested by an individual investor is smaller for insurance funds (because they are simply college savings, for example) such that investors have less incentives to monitor. Also quite possibly investors attracted to insurance funds are less sophisticated. These two explanations are not mutually exclusive. Due to data limitation we do not examine the first explanation; instead, we seek to provide evidence consistent with the second hypothesis here. We construct a test of the sophistication of a fund's investors based on their response to risk. Specifically, we perform Fama–MacBeth regressions of fund flows jointly on three performance measures—the lagged net returns, the lagged alphas from the Carhart four-factor model, and the lagged four-factor appraisal ratio, as well as their product terms with a dummy variable INS, which indicates whether a fund is an insurance fund. In addition, we include the logarithm of prior fund size (SIZE), fees (FEE), and back-end load (BKLOAD) as control variables. The test is based on the assumption that less sophisticated investors tend to ignore risk while sophisticated investors properly take

Table 8
Investor sophistication

RET	RET ∗ INS	ALPHA	ALPHA ∗ INS	APPRAISAL	APPRAISAL ∗ INS	Adj. R^2
6.66	0.98	2.75	2.02	0.04	−0.03	12.10%
(7.48)	(2.01)	(2.39)	(1.30)	(3.93)	(−2.13)	

Notes. This table reports the results of Fama–MacBeth regressions of fund flows on a set of performance measures. The independent variables include the prior one-year net return (RET), RET ∗ INS, the prior one-year four-factor alpha (ALPHA), ALPHA ∗ INS, the prior one-year four-factor appraisal ratio (APPRAISAL), APPRAISAL ∗ INS, as well as control variables SIZE, FEE, and BKLOAD. INS is the insurance fund dummy. The coefficients for the intercept, SIZE, FEE, or BKLOAD are not reported. The Newey–West t-statistics are in the parentheses.

risk into account when they make investment decisions. Therefore, whether fund flows respond more to raw returns or more to appraisal ratios provides a measure of investor sophistication.[17]

Reported in Table 8, the coefficient on the product term of the insurance dummy and the net return is positive while the coefficient on the product term of the insurance dummy and the appraisal ratio is negative, suggesting that insurance fund flows are more sensitive to net returns but less responsive to appraisal ratios. The results support the hypothesis that investors of insurance funds tend to be less sophisticated.

5. Agency problems across insurance funds

5.1. Measuring cross-selling effects

As we argue earlier, agency problems that erode fund performance are related to the cross-selling efforts by insurers. In this section, we take a closer look within insurance funds, and show that fund performance and the sensitivity of fund flow response to performance are related to insurers' cross-selling practice.

The first important type of agency problem is that cross-selling helps insurance funds to attract unsophisticated investors who monitor less. We construct four variables to capture this effect. The first measure is based on the distribution channels of insurers. Insurers can cross-sell financial products more effectively when there is a stronger relationship between insurers and their customers, and distribution channel is an important determinant of such insurer-client relationship. For example, some insurers sell policies through exclusive agents who represent a single insurance company, while others sell through brokers and independent agents representing multiple insurers, and yet others through direct selling. Insurers using exclusive agents retain the "ownership" of customers, while insurers using brokers/independent agents or using direct selling do not (Regan and Tennyson, 1996). Therefore, funds affiliated with insurers using exclusive agents may have an advantage in accessing the parents' client base and reaching out to unsophisticated investors. In addition, as discussed in Section 2.1, funds affiliated with insurance brokers have a similar advantage since insurance brokers often have close relationship with insurance buyers. To

[17] Treynor and Black (1973) illustrate that when a mean-variance optimal investor allocates investments among a benchmark portfolio and potentially mispriced securities (mutual funds), the portfolio weights on the mispriced securities (mutual funds) should depend not only on the estimated alphas, but also on the tracking errors of those securities. Therefore the appraisal ratio is more appropriate measure of fund performance for such rational investors. Our approach here is similar to Del Guercio and Tkac (2002), who examine fund flow sensitivity to both alphas and tracking errors to quantify the sophistication of pension funds in selecting fund managers.

capture the effect of differential distributional channels, we construct an EXCLUSIVE dummy which takes the value of one when the parent insurer is an insurance broker or when it primarily uses exclusive agents, and zero otherwise. Information on insurers' distribution channels is from the Best's Key Rating Guide.[18]

Our second measure is based on insurers' advertising spending. Advertising increases the visibility of insurers and potentially that of the affiliated mutual funds. This lowers investors' search costs and offers the affiliated funds an advantage in attracting and retaining investors.[19] We construct an annual ADVERTISE dummy, which equals one if the ratio of insurers' advertising expenditure to insurance premiums is above the sample median in a given year, and zero otherwise. The information on insurers' advertising expenditure and insurance premiums income is from the National Association of Insurance Commissioners Data (the NAIC data), from 1990 to 2002.[20]

The third and fourth measures are both based on the relationship between mutual funds and the parent insurance companies. In general, a closer relationship between the two often means a higher likelihood of cross-selling. A typical cross-selling strategy used by insurers is to apply their own brand names to the affiliated mutual funds. Aaker and Keller (1990) find that consumers have favorable assessment to a new product when it uses a renowned brand name of an existing product.[21] Using insurers' brand names reduces investors' search costs and makes it easy to sell mutual funds to insurers' brand-loyal customers. Following this idea, we construct an INSBRAND dummy, which equals one if a fund uses the insurer's brand name, and zero otherwise. In addition, a fund established by its parent company typically has a closer tie with its parent, and may rely more on the parent for distribution. We construct an ESTABLISHED dummy, which equals one if the fund management company is established by an insurance firm and zero if it is acquired. We check company history using the Mergent/Moody's Bank and Finance Manual and insurance company websites to determine whether an insurance fund is established or acquired by an insurer.

The second type of agency problem of concern, as discussed earlier, is the conflict of interests that arises when insurers' investment subsidiaries simultaneously manage mutual funds and a large amount of in-house money for the parent firms. While we consider this as a feature of insurers' cross-selling efforts, it creates a unique form of agency problem and therefore we treat it separately here. We term such practice as *cross-production*, and quantify its effect using an XPRODUCTION dummy, which equals one if at the end of a given year the ratio of equity

[18] The Best's Key Rating Guide is provided by A.M. Best Company. It reports the annual rating of each insurer and the key determinants used to assess an insurer's rating, including information on distribution channels. In the case that the data reports distribution channels for multiple subsidiaries of an insurer, we define the insurer's distribution channel as that of the subsidiary with the highest premiums income.

[19] Here we use insurers' advertising spending to measure their cross-selling efforts. This is different from Sirri and Tufano (1998), Reuter and Zitzewitz (2006), and Gallaher et al. (2005), who study advertising by mutual funds. These studies find that mutual fund advertising have a positive impact on fund flows.

[20] In the NAIC data, the advertising expenditure is Item 4 of Part 4 in the Underwriting and Investment Exhibit for property insurers and Item 5.2 of Exhibit 2 for life insurers. Total insurance premiums is Item 1 of the Statement of Income for property insurers and Item 1 of the Summary of Operations for life insurers. If an insurer has several subsidiaries that report data as separate entities, we combine the data for all the subsidiaries before matching the insurer data with insurance mutual funds. We do not include mutual funds of marsh and Aon in analysis involving the ADVERTISE dummy since they are insurance brokers and are not covered by the NAIC data.

[21] In marketing research, expanding business using an established brand name is known as "brand extension." See Keller (2003) for a review of related literature.

mutual fund assets to the total value of equity assets managed by the investment management subsidiary of an insurer is below the sample median, and zero otherwise. Specifically, the equity mutual fund assets are the aggregate TNAs of equity mutual funds managed by the investment subsidiary, computed using the CRSP mutual fund data. The aggregate value of equity assets managed by the subsidiary is computed using the 13F data, which provides information on equity holdings of institutional investors.

To be sure, managing a large asset base per se does not always hurt performance. Chen et al. (2004) show that funds belonging to a larger fund family often have better performance as larger fund families can more effectively economize on trading commissions and reduce other types of operating costs. However, as they point out, crucial to achieving such economies of scale is that in a large fund family there are many fund managers picking stocks without substantial coordination. The cross-production efforts of insurers are quite different in this aspect—for instance, it is often the case that the same insurance fund manager manages a small-cap growth mutual fund and an in-house small-cap growth portfolio with similar compositions. In such a situation, due to the effect of liquidity and transaction costs, the total size of assets under management is not necessarily a benign factor for performance. More important is the conflict of interests cross-production introduces—if the performance of in-house assets is more important to insurers, the investment subsidiary may naturally seek to allocate more resources to managing in-house assets than to managing mutual funds. In a recent study, Gaspar et al. (2006) document cross-fund subsidization within mutual fund families in the form of differential allocation of IPO shares and opposite trades conducted to benefit one fund at the cost of the other. Such differential resource allocation and favoritism may as well occur between mutual funds and in-house portfolios, most likely at the cost of mutual funds. For these reasons, we expect fund performance to be negatively correlated with the cross-production efforts.

5.2. *Performance*

We first perform Fama–MacBeth regressions to examine how cross-selling (including the cross-production effort) affects fund performance. The regressions are performed in each year. The dependent variable is fund performance, PERF, as measured by the four-factor alpha. The regressors include one of the five dummy variables described above, as well as control variables including lagged SIZE, FEE, and FAMSIZE. SIZE and FEE are defined previously. Following Chen et al. (2004), we define FAMSIZE as the logarithm of one plus the total net assets of all other funds in the fund family. The time-varying dummy variables ADVERTISE and XPRODUCTION are lagged for one year.

The time-series averages of the coefficient estimates, as well as their Newey–West t-statistics, are reported in Table 9. We find that the average coefficients for INSBRAND, ESTABLISHED, ADVERTISE, and XPRODUCTION are significantly negative. The coefficient on the EXCLUSIVE dummy is also negative, although not statistically significant. The results are similar when we use all five dummy variables jointly as regressors. Furthermore, in untabulated analysis, we have examined the "within" effect and the "between" effect for ADVERTISE, XPRODUCTION, SIZE, FAMSIZE and FEE, a set of variables that may vary over time for a given fund. We find a strong "between" effect but an insignificant "within" effect. That is, the variation in fund performance is mainly explained by the cross-sectional differences in these variables, rather than by time-series variations of these variables for the same fund. Overall, these findings suggest that insurance funds relying more on cross-selling are more likely to underperform.

Table 9
Cross-sectional regression of insurance fund performance

	(A)	(B)	(C)	(D)	(E)	(F)
Intercept	0.467	0.560	0.513	0.521	0.468	0.605
	(10.89)	(10.67)	(13.26)	(12.94)	(10.08)	(11.27)
EXCLUSIVE	−0.011					−0.010
	(−1.07)					(−0.81)
ADVERTISE		−0.038				−0.021
		(−2.05)				(−1.82)
INSBRAND			−0.050			−0.024
			(−3.73)			(−1.83)
ESTABLISHED				−0.044		−0.039
				(−3.84)		(−2.28)
XPRODUCTION					−0.019	−0.013
					(−1.83)	(−2.17)
SIZE	−0.021	−0.013	−0.017	−0.016	−0.007	−0.016
	(−1.66)	(−1.25)	(−1.96)	(−1.72)	(−1.84)	(−1.53)
FAMSIZE	0.003	0.003	0.001	0.001	0.005	0.004
	(0.40)	(0.45)	(0.18)	(0.36)	(1.47)	(1.15)
FEE	−4.961	−4.739	−0.397	−1.10	−0.943	−3.583
	(−2.84)	(−2.67)	(−0.49)	(−1.49)	(−1.24)	(−1.95)
Adj. R^2	15.5%	16.3%	14.1%	14.1%	14.8%	29.3%

Notes. This table reports the results of Fama–MacBeth regressions for insurance fund performance. The dependent variable is the four-factor alpha. The independent variables include five dummy variables—EXCLUSIVE, ADVERTISE, INSBRAND, ESTABLISHED, and XPRODUCTION, as well as three control variables—the logarithm of a fund's lagged total net assets (SIZE), the logarithm of lagged fund family size (FAMSIZE), and the fees (FEE) in the prior year. The EXCLUSIVE dummy equals to one when the parent insurer is an insurance broker or when it primarily uses exclusive agents, and zero otherwise. The ADVERTISE dummy equals one if the fraction of advertising expense in insurance premiums is above the sample median, and zero otherwise. The INSBRAND dummy equals one if an insurance fund uses the brand name of its parent firm, and zero otherwise. The ESTABLISHED dummy equals one if the fund management company is established by an insurance company, and zero otherwise. The XPRODUCTION dummy equals one if the proportion of mutual fund assets in the total assets managed by the asset management subsidiary of an insurer is below the sample median, and zero otherwise. ADVERTISE and XPRODUCTION are lagged for one year. The Newey–West t-statistics are in the parentheses.

It is noted that some of the control variables, when measured in contemporaneous term with fund performance, may be endogenously affected by the decisions of funds or fund families. When using lagged SIZE and FAMSIZE as regressors, we can remove the endogeneity concern for these two variables. However, using lagged FEE may not completely remove the endogeneity problem, because funds with governance problems may set fee structure differently. However, we find that the statistical significance of coefficients for the cross-selling dummy variables remains similar after removing FEE from the regression, or adding FEE to fund returns when computing fund performance measures. Further alleviating the concern, we find that insurance funds and non-insurance funds have quite similar level of FEEs. These additional results are not tabulated here for the interest of brevity.

5.3. Flow-performance relationship

We further examine whether the flow-performance insensitivity, a typical symptom of lack of investor monitoring, is attributable to cross-selling. For this purpose we perform Fama–MacBeth regressions with the annual fund flow as the dependent variable. The main explanatory vari-

ables of interest are the four-factor alpha in the prior year (PERF) and its product term with one of the first four cross-selling dummy variables (EXCLUSIVE, ADVERTISE, INSBRAND, and ESTABLISHED). For the comparison purpose we also include the product of PERF and XPRODUCTION as an explanatory variable, although based on our previous discussion cross-production may affect fund performance for reasons unrelated to investor monitoring. Again, ADVERTISE and XPRODUCTION dummies are lagged for one year. Finally, we use lagged SIZE, FEE, BKLOAD, and STD as control variables.

The results are reported in Table 10. The coefficient on PERF ∗ EXCLUSIVE is negative and significant at the 5 percent level for the one-sided test. The coefficients for PERF ∗ ADVERTISE, PERF ∗ INSBRAND, and PERF ∗ ESTABLISHED are all negative and significant at the 1 percent level. These results suggest that cross-selling by insurers reduces investor monitoring and therefore reduces flow-performance sensitivity. The coefficient on PERF ∗ XPRODUCTION is insignificant, indicating that cross-production does not significantly affect the degree of investor monitoring. In a joint regression where all the five product terms are used together as regressors, the coefficients for PERF ∗ EXCLUSIVE and PERF ∗ INSBRAND remain negative but become less significant, possibly due to correlations among the five regressors. The coefficients for PERF ∗ ADVERTISE and PERF ∗ ESTABLISHED remain significantly negative, while that for PERF ∗ XPRODUCTION continues to be insignificant.

Table 10
Cross-sectional regression of insurance fund flows

	(A)	(B)	(C)	(D)	(E)	(F)
INTERCEPT	0.025	0.006	0.024	0.030	0.011	0.022
	(1.38)	(0.33)	(1.57)	(1.95)	(0.77)	(1.22)
PERF ∗ EXCLUSIVE	−0.023					−0.016
	(−1.68)					(−0.93)
PERF ∗ ADVERTISE		−0.031				−0.026
		(−2.54)				(−2.15)
PERF ∗ INSBRAND			−0.032			−0.022
			(−3.73)			(−1.15)
PERF ∗ ESTABLISHED				−0.052		−0.047
				(−5.99)		(−2.67)
PERF ∗ XPRODUCTION					−0.004	0.012
					(−0.37)	(0.26)
PERF	0.132	0.147	0.148	0.151	0.144	0.108
	(7.98)	(8.74)	(8.84)	(9.64)	(7.58)	(2.00)
SIZE	−0.021	−0.019	−0.018	−0.019	−0.018	−0.024
	(−10.13)	(−8.11)	(−10.41)	(−10.54)	(−11.03)	(−6.27)
FEE	1.338	1.402	1.362	1.223	1.697	0.040
	(2.93)	(3.47)	(3.32)	(3.21)	(4.39)	(0.44)
BKLOAD	0.014	0.009	0.017	0.018	0.016	1.237
	(1.79)	(1.30)	(2.09)	(2.12)	(2.15)	(2.61)
STD	0.348	0.476	0.316	0.320	0.286	0.012
	(1.36)	(1.73)	(1.23)	(1.35)	(1.21)	(1.92)
Adj. R^2	16.7%	16.4%	15.4%	15.5%	15.1%	30.5%

Notes. This table reports the results of Fama–MacBeth regressions of insurance fund flows. The dependent variable is fund flow. The independent variables include the prior one-year four-factor alpha (PERF), the products of PERF with five dummy variables—EXCLUSIVE, ADVERTISE, INSBRAND, ESTABLISHED, and XPRODUCTION, as well as control variables: lagged SIZE, FEE, BKLOAD, and STD. The Newey–West t-statistics are in the parentheses.

In sum, the cross-selling efforts by insurers reduce flow-performance sensitivity and have a negative impact on mutual fund underperformance. These results are consistent with the agency problem hypothesis.

6. Conclusion

Mutual funds managed by insurers or their investment subsidiaries underperform non-insurance peer funds. In this paper, we show that such underperformance is unlikely due to the prudence concern of insurance fund managers. Rather, we find evidence that insurers' efforts to cross-sell mutual funds create incentive problems that erode fund performance. First, for poorly performing insurance funds, flows are typically insensitive to past performance; as a result, insurance fund managers are insufficiently pressured to improve performance. Second, relative to non-insurance funds, insurance fund flows are more responsive to past raw returns and less responsive to risk-adjusted measures such as the appraisal ratios, suggesting that cross-selling enable insurance funds to attract unsophisticated investors. Finally, insurance funds more likely to rely on cross-selling tend to suffer more from flow-performance insensitivity and are more likely to underperform.

While we have focused on a particular section of the mutual fund industry, issues documented in this paper are not necessarily unique to the insurance funds. In particular, given the lack of external takeover threats and weak mutual fund boards, the flow-performance sensitivity resulting from vigilant investor oversight serves as a critical fund governance mechanism. Therefore, underperformance due to lack of investor monitoring is quite likely a universal problem in the fund business. In addition, conflict of interests as a result of cross-production may affect mutual funds sponsored by other types of financial institutions, such as commercial banks and investment banks. These issues are important for the mutual fund industry and deserve further academic attention.

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