Fund Expenses and Vertical Integrations in the Fund Industry

Han, Jaejoon[1]

Kang, Kyeong-Hoon[2]

Won, Seung Yeon[3]

[1] The School of Business Administration, Inha University, Incheon 402-751, Korea, Tel: 82-32-860-7817, Email: jjhan@inha.ac.kr

[2] The School of Business Administration, Dongguk University, Pil-Dong 3-Ga, Joong-Gu, Seoul, Korea, Tel: 82-2-2260-8909, Email: khkang@dongguk.edu

[3] The Department of Economics and Finance, Yeungnam University, 214-1 , Gyeongsan-Si, Korea, Tel: 82-53-810-2713, Email: sywon@ynu.ac.kr

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Abstract

This paper examines, theoretically and empirically, the pricing of fund fees by vertically integrated and independent distribution channels. There is much evidence from several countries showing that distribution channels do not deliver sufficient benefits to investors. Using a game-theoretic model, we show that the distribution channels that are integrated with asset management companies have an incentive to charge higher sales fees than the independent channels that do not have such links; the vertically integrated distribution channels tend to raise the costs of rival asset management companies. We also found that the integrated asset management companies have an incentive to set lower management fees than the independent ones. In certain circumstances, the equilibrium is asymmetric: a channel may want to be vertically integrated with an asset management company, whereas the other wants to remain independent. The study empirically tests the theoretical findings using data from the Korean fund market. The empirical evidence supports the proposed theoretical argument.

1. Introduction

Funds have become one of the most popular investment vehicles that individual investors use to participate in the capital market. With the dramatic growth of the fund market, a plethora of research concerning fund returns and costs has been published. This paper examines fund expenses. Although there have been many empirical studies on fund expenses, it is difficult to find theoretical works concerning the determination of fund expenses.

In particular, this paper is interested in the effects of distribution channels on fund expenses. Distribution channels are important in the fund industry. With the rapid growth of the industry, the number and type of funds have expanded exponentially. For example, there are currently more than nine thousand funds in the Korean fund market. Thus, it is very difficult or costly for individual investors to select funds that fit their personal needs. To facilitate this situation, distribution channels serve to mediate between the fund providers (i.e., asset management companies) and the fund demanders (i.e., investors).

Distribution channels, however, do not seem to deliver sufficient benefits to investors. Bergstresser, Daniel, Chalmers, and Tufano (2009) found that, compared with direct-sold funds, broker-sold funds deliver lower risk-adjusted returns. Lesseig, Long, and Smythe (2005) noticed that the ownership of asset management companies[4] plays an important role as a determinant of expenses. They also found that funds operated by financial firms generate savings from fund administration but pass only a portion of these savings on to investors. Using Finnish data, Korkeamaki and Smythe (2004) found that funds managed by banks charge higher expenses but that investors are not compensated through higher risk-adjusted returns. Korpela and Puttonen (2005) reported a finding that is consistent with Korkeamaki and Smythe (2004). Won (2009) tested the case of the Korean fund market and showed that funds with higher sales fees do not exhibit better performance.

These findings can be interpreted as an indirect evidence of the strategic behavior of the banks as distribution channels when individual investors are locked in to

[4] They referred to asset management companies as fund companies in their paper. These two terms have the same meaning.

the banks. In this case, individual investors have to shoulder substantial costs of switching to other financial service providers. Banks operate networks of branches or ATMs in order to effectively provide payment and settlement services, etc. Though it is very costly to establish and manage these networks, these help banks by encouraging customers to be loyal. This loyalty can be utilized by banks in their pricing strategy with regard to other services such as the distribution of funds. If banks are independent in the sense that they are not affiliated with asset management companies, they would lack this type of incentives. In the real world, however, most big banks have their own asset management companies, and a vast body of evidence suggests that large firms push their own products over alternatives. Even Charles Schwab, which has proclaimed its "independence from conflicts of interest so common on Wall Street" in many advertisements, was found to have placed four of its own funds on its "short list" of 20 funds.[5]

Using a game-theoretic model, this paper examines these strategic behaviors and the effects on their fund fee pricing. We find that a distribution channel, integrated with an asset management company, charges higher sales fees than an independent bank. Through this action, the integrated asset management company indirectly raises the costs of its rival asset management companies. The integrated asset management company has incentives to set lower management fees than other independents. Another interesting finding from the model is that, in certain circumstances, the equilibrium is asymmetric in the sense that a distribution channel wants to be vertically integrated with an asset management company, while the other channel wants to remain independent. The paper contributes by providing a theoretical model that could further explain prior studies on empirical findings with regard to fund expenses and distribution channels, as there have been few theoretical explanations with respect to these factors.[6]

Our model is based on Salinger (1988). There have been many papers on the effects of vertical integration in the field of industrial organization.[7] Some of them focused on the strategic incentives of raising rival's costs, and Salinger's (1988) is

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5 "Schwab Gives Own Funds Top Billing – Brokerage Firm's 'Short List' Includes 4 of Its Portfolios, Raising Concerns of Conflict", by Aaron Lucchetti, Wall Street Journal, September 3, 2002.

6 A remarkable exception is Bolton et al. (2007) which also uses a game-theoretic model. However, they were interested not in banks' pricing but in banks' incentives to reveal their private information.

7 For a survey of these papers, refer to Riordan (2008).

canonical. Though Salinger's model is appropriate for analyzing the incentives of vertically integrated firms, it is hardly applicable to the fund industry. In Salinger's model, vertically integrated firms only decide whether to foreclose the upstream market. On the contrary, our model allows distribution channels to sell funds of non-affiliated asset management companies. Another difference of our model from Salinger's (1988) is the existence of switching costs. The switching costs delay the shift (induced by increased fees) by investors to other distribution channels.

In our model, a distribution channel can raise its sales fees in order to increase the costs of its rival asset management companies. Although same fees are imposed on every asset management company, an affiliated distribution channel is not concerned about higher fees because its payment contributes to the income of its parent company. After all, a vertically integrated bank will choose to raise its fees, if the increased profits from its affiliated asset management company are larger than the losses in sales fees revenue (caused by the raise). Under certain parameter ranges, a distribution channel may want to be vertically integrated while the other does not.

In addition to these theoretical findings, this study also provides an empirical test of these results using data from the Korean fund market. The empirical evidence supports our theoretical explanations.

Section 2 presents the model. Section 3 analyzes the equilibrium of the game. An empirical test is provided in Section 4. Section 5 concludes.

2. Model

If an individual investor wishes to invest money in a fund, the investor needs to buy two kinds of services: the asset management service and the fund distribution service. The asset management service is provided by asset management companies and the distribution service is provided by distribution channels. For simplicity, we assume there are no direct sales of funds to end investors by asset management companies. Both types of services are assumed to be produced at zero marginal costs. While there are many asset management companies, only two channels are responsible for distributing funds. And the demand functions facing the two distribution channels are as follows:

$$q_1 = 1 - ap_1 + b(p_2 - p_1)\ ;\ q_2 = 1 - ap_2 + b(p_1 - p_2),\ \text{where}\ \ a + b > 0, \qquad (1)^{8}$$

q_1 is the quantity of funds sold by Channel 1, and q_2 is by Channel 2. p_1 and p_2 are the total fees for a unit of fund sold by Channel 1 and Channel 2, respectively. Since the two channels charge f_1 and f_2 for their distribution services, the asset management company receives $p_1 - f_1$ or $p_2 - f_2$ for its asset management services. The last parts of the demand functions represent competition between the two channels. If the parameter b is large and the difference between the prices is also large, an increase in p_1 will result in greater shift of q_1 to the channel 2. In this sense, parameter b means the magnitude of the switching costs of individual investors. The above demand equations imply that there is no meaningful difference among asset management services. Every asset management company provides the same quality of services in terms of investment returns before deducting various fees and thus cannot increase its management fees for higher performance. Although this is not a realistic assumption, it will serve to focus on the issue of the sales fees and vertical integration.

The whole game consists of three stages. In the first stage, each channel decides whether to integrate an asset management company. In the next stage, the two channels announce their own sales fees, f_1 and f_2. These fees are imposed to each unit sold to end investors. In the last stage, there is a Cournot game among the asset management companies. That is, given f_1 and f_2, every asset management company determines its production level. Since the two channels are distributing all funds, each asset management company decides the production levels for the two distribution channels. When company j sells its fund through channel i, the sales of funds are denoted as q_{ij}, where i = 1, 2 and j = 1, 2, . . . , n. As a result, total fund sales through the two channels are as follows:

$$q_1 = q_{11} + q_{12} + \ldots + q_{1n}\ ,\ q_2 = q_{21} + q_{22} + \ldots + q_{2n}\ .$$

When all the decisions of q_{ij}'s are made, the prices, i.e. the total fees, are set endogenously in the market, and an asset management company will receive $q_{1j}(p_1 - f_1) + q_{2j}(p_2 - f_2)$.

[8] Since $a+b$ represents own price elasticity, it should be positive.

3. Equilibrium Analysis

The entire game is a type of a dynamic game of complete information. Thus, backward induction is applied to find the equilibrium of the game.[9] The decisions of the two distribution channels in the first stage will produce three cases: when both channels are independent, when a channel is integrated and the other is independent, and when both channels are vertically integrated. We analyze the equilibrium prices and profits for each case and then find the equilibrium of the whole game.

A. When both channels are independent

The equilibrium prices and profits when both channels do not integrate the asset management companies are first considered. In this case, the profit function for channel i is defined as the product of the total fund distributed through i and the distribution fee, f_i:

$$\pi_1 = f_1 \sum_j^J q_{1j}, \quad \pi_2 = f_2 \sum_j^J q_{2j}. \qquad (2)$$

The profit function for asset management company j is defined as the product of funds managed by j and the associated management fees ($p_1 - f_1$ or $p_2 - f_2$):

$$\pi_j = (p_1 - f_1) q_{1j} + (p_2 - f_2) q_{2j}, \ j = 1, 2, \ldots, n. \qquad (3)$$

By rearranging equation (1), p_1 and p_2 can be driven as a function of $\sum_j^J q_{1j}$ and $\sum_j^J q_{2j}$:

$$p_1 = \frac{a + 2b - (a+b)\sum_j^J q_{1j} - b\sum_j^J q_{2j}}{a(a+2b)}, \quad p_2 = \frac{a + 2b - (a+b)\sum_j^J q_{2j} - b\sum_j^J q_{1j}}{a(a+2b)}. \qquad (4)$$

Now, the method of backward induction is applied. The equilibrium quantities in the final stage are determined, and then the second stage will be addressed. In the final stage, given f_1 and f_2, an asset management company j decides q_{ij} in the manner of a Cournot competitor. More specifically, if p_1 and p_2 in equation (4) are inserted into the profit functions in (3), the profit maximization problem with respect to q_{1j} and q_{2j} will yield:

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[9] For a detailed explanation about backward induction, refer to Fudenberg and Tirole (1991).

$$q_{1j} = \frac{1-(a+b)\,f_1+bf_2}{1+n}, \quad q_{2j} = \frac{1-(a+b)\,f_2+bf_1}{1+n} \quad \text{for all j = 1, 2, . . . , n .} \tag{5}$$

In equation (5), equilibrium q_{1j} and q_{2j} are the functions of f_1 and f_2. To solve the second stage, equation (5) is inserted into equation (2) so that each channel's profit function is driven as a function of f_1 and f_2 as follows:

$$\pi_1 = \frac{n}{1+n} f_1(1+bf_2-(a+b)\,f_1), \quad \pi_2 = \frac{n}{1+n} f_2(1+bf_1-(a+b)\,f_2) \quad . \tag{6}$$

The two channels' simultaneous profit maximization problems with respect to f_1 and f_2 give the equilibrium levels of f_1 and f_2. The consequent profits are given as follows:

$$f_1^* = \frac{1}{2a+b} = f_2^*, \quad \pi_1^* = \frac{n}{1+n}\frac{a+b}{(2a+b)^2} = \pi_2^* \quad . \tag{7}$$

In the above equations, parameters a and b capture price elasticity of end investors. In particular, equation (1)'s own price elasticity is $-(a+b)$, and cross price elasticity is b. In equation (7) the profits of channels decrease as price elasticity becomes greater, but they increase as there are more asset management companies. This is because it becomes more difficult for channels to raise fee if investors become more sensitive to the fees charged and because the effects of double marginalization decrease as there are more asset management companies. Using the equations in (7), asset management company j's profit function is expressed as follows:

$$\pi_j^* = \frac{2(a+b)^2}{a(2a+b)^2(1+n)^2} \quad .$$

Unless there are infinitely many asset management companies, each company enjoys positive profits. They are assumed to produce management services at zero marginal cost, but they charge positive management fees. Asset management companies' profits decrease when the elasticity parameter increases. In particular, the decrement is sensitive to a, own elasticity, relative to b. Regardless, profits decrease as competition among them increases.

B. When only one channel is integrated

Without the loss of generality, Channel 1 is assumed to have decided to integrate with an asset management company, say $j = 1$, while Channel 2 remains independent. Since asset management companies make positive profits and it is costly to consolidate two firms under a single umbrella, Channel 1 needs to take a fixed cost F to merge with asset management company 1. Hence, the M&A decision of channels implies that the profit increment is greater than the fixed integration cost, F, which should be paid as up-front sunk cost. Though exclusive dealing is possible after integration, Channel 1 is willing to sell the funds of other asset management companies. However, Channel 1 should impose the same sales fees to all of the funds it distributes. Channel 2 distributes funds in the same manner as in subsection A.

Channel 1's profit function changes can then be expressed as follows:

$$\pi_1 = f_1(\sum_{i\neq 1} q_{1j}) + p_1 q_{11} + (p_2 - f_2) q_{21} - F \quad . \tag{9}$$

In equation (9), Channel 1 receives sales fees from other asset management companies as before, and it also collects management fees from its own sales, q_{11}, and from the distribution by Channel 2, q_{21}. Note that the term $f_1 \times q_{11}$ disappears from the profit function of the integrated Channel 1. Other players' profit functions are the same as in subsection A. The equilibrium is asymmetric, and the equilibrium quantities in the final stage are as follows:

$$q_{1j\neq 1} = \frac{1-2(a+b)f_1+bf_2}{1+n}, \quad q_{2j\neq 1} = \frac{1-(a+b)f_2+bf_1}{1+n}, \text{ for all j except for j = 1} \tag{10}$$

$$q_{11} = \frac{1-(a+b)(n-1)f_1+bf_2}{1+n}, \quad q_{21} = \frac{1-(a+b)f_2+b(n-1)f_1}{1+n} \quad . \tag{11}$$

The magnitude of q_{11} and q_{21} is bigger than q_{1j}, q_{2j}, reflecting an asymmetric competitive structure between the integrated and the independent asset management companies.

The second stage is solved as previously described, and the equilibrium prices are as follows:

$$f_1^* = \frac{(2a+3b)n}{4a^2n+8abn+b^2(1+3n)}, \quad f_2^* = \frac{(2a+3b)n-b}{4a^2n+8abn+b^2(1+3n)} \tag{12}$$

$$p_1^* = \frac{1+af_1^*n-af_1^*}{a(1+n)}, \quad p_2^* = \frac{1+af_2^*n}{a(1+n)} \quad . \tag{13}$$

In equation (12), the magnitude of f_1, the integrated Channel 1's sales fees, is greater than f_2. On the other hand, p_1^*, the equilibrium total fees of Channel 1, are lower than p_2^* if $a + b > 0$, which has already been assumed. These findings lead to the following proposition.

Proposition 1: *When only one channel integrates, it charges higher sales fees ($f_1^* > f_2^*$), and management fees collected by asset management companies are lower for funds distributed through the integrated channel ($p_1^* - f_1^* < p_2^* - f_2^*$).*

The intuition behind Proposition 1 is that the integrated Channel 1 can provide benefits to its newly integrated asset management company by increasing sales fees. Since this increase in sales fees does not discourage asset management company 1,[10] it can dramatically increase its market share in q_1. Eventually, this dramatic increase in q_{11} overwhelms the decreases in the supply of other asset management companies, keeping p_1 less than p_2. Although raising f_1 seems to be harmful to the integrated Channel 1 at first glance, the increased f_1 is internalized within the integrated entity, and it results in bigger profits to the integrated Channel 1. Plugging f_1^*, f_2^*, p_1^*, and p_2^* into the players' profit functions yields the following:

$$\pi_1^* = \frac{2b^4(1+3n)^2 + 4a^4n^2(2+2n+n^2) + 4a^3bn(1+10n+8n^2+4n^3) + ab^3(3+26n+60n^2+18n^3+9n^4) + a^2b^2(1+18n+74n^2+42n^3+21n^4)}{a(1+n)^2(4a^2n+8abn+b^2(1+3n))^2}$$

$$\pi_2^* = \frac{(a+b)n(2an+b(-1+3n))^2}{(1+n)(4a^2n+8abn+b^2(1+3n))^2)}, \quad \pi_j^* = \frac{(a^2+3ab+2b^2)(b+2an+3bn)^2}{a(1+n)^2(4a^2n+8abn+b^2(1+3n))^2} \text{ for } j = 2, \ldots, n.$$

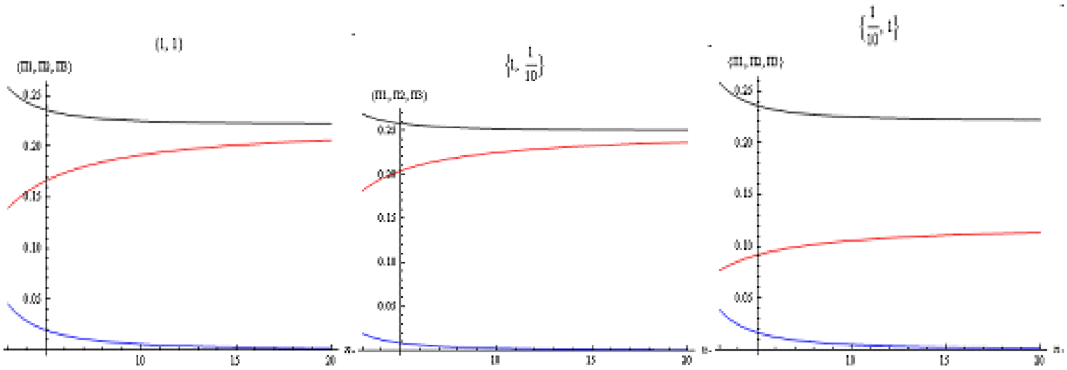
Since the profit functions are difficult to compare analytically, a study of comparative statics is provided. A simple simulation comparing the profits of Channel 1 before and after the integration shows that the integration is good for Channel 1.[11] The following figure shows the profits of three players: black for Channel 1, red for Channel 2, and blue for an independent asset management company. The first panel in Figure 1 illustrates the changes in profits across n, running from 3 to 20 when $a = b = 1$. The

[10] Remember that the term $f_1 \times q_{11}$ disappears from the profit function of the integrated Channel 1.

[11] This result is robust to the reasonable changes in the values of parameters a, b and n: $a \times b \times n = [0,1] \times [0,1] \times [3,300]$

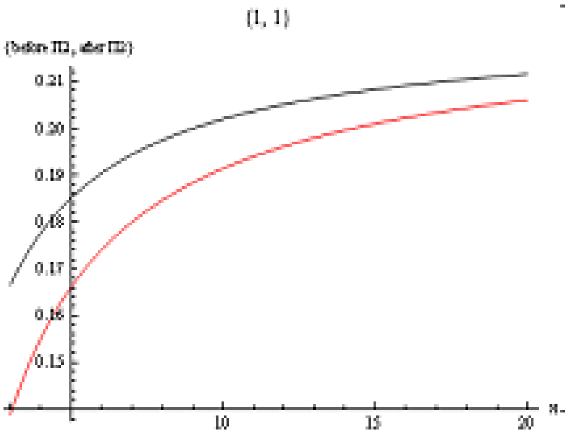
second panel illustrates the changes when a = 1 and b = 1/10, and the last panel shows the changes when a = 1/10 and b = 1.

Figure 1



Chanel 1's profits decrease when the number of asset management companies increase, whereas Channel 2's profits increase with an increase in the number of companies. This is because stiffer competition among asset management companies results in lower management fees and limits the effect of raising sales fees by Channel 1. Channel 2's profits are negatively affected by the integration of Channel 1 as shown in Figure 2. The red curve, Channel 2's profits after the integration of Channel 1, is uniformly under the black curve, its profits before the integration.

Figure 2



C. When both channels decide to integrate

If both channels decide to integrate asset management companies, Channel 2's profit functions will be the same as Channel 1's described previously. Independent asset management companies' profit functions are the same as before. New profit functions are obtained from modifying equations (3) and (9):

$$\pi_1 = f_1(\sum_{i\neq 1} q_{1j}) + p_1 q_{11} + (p_2 - f_2)q_{12} - F, \quad \pi_2 = f_2(\sum_{i\neq 2} q_{2j}) + p_2 q_{22} + (p_1 - f_1)q_{21} - F \qquad (14)$$

$$\pi_j = (p_1 - f_1)q_{1j} + (p_2 - f_2)q_{2j}, \quad j = 3, \ldots, n \;. \qquad (15)$$

The application of the same backward induction as previously described results in the following equilibrium prices:

$$f_1^* = f_2^* = \frac{n^2 + 2n - 3}{2a(n^2 + 2n - 3) + b(1 + n^2)},$$

$$p_1^* = p_2^* = \frac{a\left[n^2 + 2n - 3\right] + b(1+n)}{a\left[2a(n^2 + 2n - 3) + b(1 + n^2)\right]} = f_1^* + \frac{b(1+n)}{a\left[2a(n^2 + 2n - 3) + b(1 + n^2)\right]}.$$

D. Equilibrium of the whole game

The analysis presented thus far can be summarized as shown in the following payoff matrix which the two channels face in the first stage of the game. In this stage, each channel has two options: "Integrate" or "Do Not Integrate." The superscripts on π's represent the number of subsections. For example, π_I^A is the profits to a channel for Subsection A, where the two channels decide to be independent. If only one channel decides to integrate as in Subsection B, its profits will be $\pi_I^B - F$, and the other nonintegrated channel will make the profits of π_{NI}^B.

		Channel 2	
		Do Not Integrate	Integrate
Channel 1	Do Not Integrate	π_{NI}^A, π_{NI}^A	π_{NI}^B, $\pi_I^B - F$
	Integrate	$\pi_I^B - F$, π_{NI}^B	$\pi_I^C - F$, $\pi_I^C - F$

Now the whole game comes down to a simultaneous-move game of complete information, and its equilibrium depends on the relative magnitude of F, the fixed costs for integration. If F is zero or small enough, both channels would always want to integrate. On the contrary, if F is very large, no channel would want to integrate.

In particular, the equilibrium is asymmetric when F is in certain ranges. Suppose a = 0.5, b = 0.05, and n = 5. Then, the payoff matrix changes into the following:

<table>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Channel 2</td></tr>
<tr><td>Do Not Integrate</td><td>Integrate</td></tr>
<tr><td rowspan="2">Channel 1</td><td>Do Not Integrate</td><td>0.3467, 0.3467</td><td>0.3413, 0.4294 – F</td></tr>
<tr><td>Integrate</td><td>0.4294 – F, 0.3413</td><td>0.4160 – F, 0.4160 – F</td></tr>
</table>

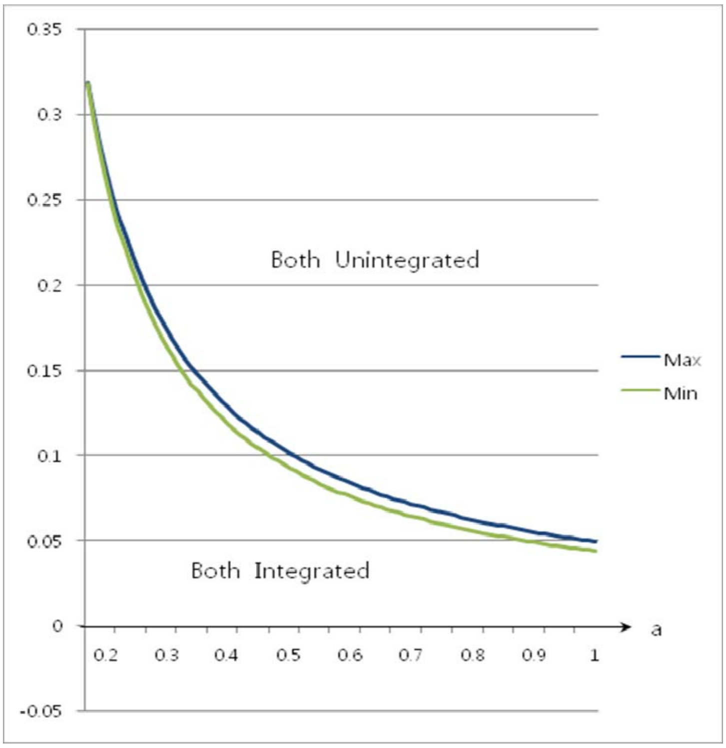
In this situation, if F = 0.08, the pure Nash equilibria are the sets of (Integrate, Do Not Integrate) and (Do Not Integrate, Integrate).[12] In a similar fashion, Figure 3 shows the ranges of the fixed costs to support each type of equilibrium when b = 0.05 and n = 5. If the values of parameter a and the fixed costs are in the top area, the equilibrium is (Do Not Integrate, Do Not Integrate); if the values are in between the two lines, the equilibrium is asymmetric. These arguments can be summarized into the following proposition.

Proposition 2: *With parameters in certain ranges, the equilibrium of the whole game is asymmetric in the sense that one distribution channel decides to integrate an asset management company, while the other channel wants to be independent.*

[12] In this example, if F = 0.09, the Nash equilibrium is (Do Not Integrate, Do Not Integrate) and if F = 0.07, the Nash equilibrium is (Integrate, Integrate).

It is noticeable that the relatively low values of parameter *a* cannot give rise to an asymmetric equilibrium. In the previous illustration with *b* =0.05, if *a* is less than 0.18, there is no asymmetric equilibrium. When *a* is relatively low, the payoffs from mimicking rival's vertical integration, $\pi_I^C - \pi_{NI}^B$, are greater than the benefits of the first mover, $\pi_I^B - \pi_{NI}^A$. This is because a low *a* reduces the effectiveness of discounted sales by the newly integrated asset management companies. The higher the *a*, the larger the effect of lowering p_1^*, which produces more demand and profits.

Figure 3: Ranges of fixed costs to support asymmetric equilibrium



4. Empirical Test

We performed an empirical analysis to verify the theoretical rationale presented in this paper, focusing on the first proposition. Although the second proposition regarding asymmetric equilibrium has some value for theoretical approaches (in fact, the real world fund industry is asymmetric in that there are both vertically integrated and independent channels), it is difficult to verify empirically.

According to our model, a vertically integrated distribution channel has an incentive to raise its sales fee to help its affiliated asset management company increase market shares. As a result, the affiliated company's share in the total sales of its parent company's distribution channel increases sharply. Although we do not have sufficient data to empirically test this finding, most of the affiliated asset management companies in Korea represent large shares in the total sales of their parents' channels. For example, 50.4% of the funds sold by all distribution channels in 2008 were those of their affiliated asset management companies.

A. Data[13]

The empirical test is limited to pure equity funds. We excluded bond funds and MMFs from the data set. The bond funds are sold to institutional investors which are much less dependent upon distributor network or reputation. The returns of MMFs are not significant enough for the fee structure to be differentiated by distributors. Among equity funds, privately placed funds and index funds were also excluded from our data set for similar reasons.

The data set covers all funds launched from January 2000 to July 2009. We included all funds available during this period regardless of the actual availability of funds in the market. This was done to remove the possible survivorship bias. This left a total of 947 funds. Load funds (i.e., funds that collect a commission from investor assets, thus usually receiving a lower sales fees) were also excluded. This left a total of 691 samples in the data set.

B. Summary statistics

Table 1 summarizes the annual fee schedules of the funds in the data set. The average total service fees are 1.975%. The sales fees are 1.333%, representing 64.3% of

[13] We obtained the data set from Zeroin, a leading fund rating agency in Korea.

the total service fees. Although the sales fee ratio varies yearly, the differences were not statistically significant. Thus, empirical tests were conducted using the pooled data set.

Table 1. Fees for pure equity type funds

(unit: %)

Launched year	Number of Funds	Total service fees	Sales fees	Management fees	Other fees	Sales fee ratio
2000	7	2.543	2.014	0.395	0.050	77.4
2001	108	1.595	1.054	0.491	0.050	57.3
2002	61	1.831	1.244	0.536	0.051	64.3
2003	33	2.071	1.529	0.497	0.045	72.6
2004	40	2.262	1.628	0.614	0.051	71.4
2005	89	2.185	1.503	0.631	0.052	66.9
2006	66	1.900	1.266	0.588	0.046	64.8
2007	152	2.083	1.377	0.659	0.047	64.3
2008	90	1.991	1.296	0.645	0.050	63.0
2009	45	1.959	1.267	0.638	0.053	64.0
Total	691	1.975	1.331	0.595	0.049	64.3

*sales fee ratio = (sales fee/total fee)×100%

The actual fee structures in the market are different from those represented in models. In the proposed model of this study, each asset management company runs just two funds, e.g., q_{1j} and q_{2j} for company j. In the real world, however, an asset management company runs various funds that are sold through many distribution channels. These differences lead us to classify the samples in our data set into four groups: (1) Integrated, (2) Integrated-only, (3) Independent, and (4) Non-affiliated.[14] The first group, (1) Integrated, represents the funds managed by vertically integrated asset management companies and sold through various channels including the integrated channel. (2) Integrated-only represents the group of funds managed by vertically integrated asset management companies and sold only through the integrated channels. (3) Independent represents the set of funds sold through independent distribution channels. Lastly, (4) Non-affiliated represents the funds managed by

14 Usually, a fund's provisions include information about its distributors and the asset management company. We used this information for this classification.

vertically integrated asset management companies and sold through channels excluding the integrated channels. (1) and (3) represent the two types of funds in our model. Although (2) and (4) are not represented in the model, it is evident that the vertically integrated channel does not have any incentive to raise sales fees to increase the cost of rival asset management companies in these cases. Therefore, it is predicted that the funds in (1) will have the highest sales fees.

The following table shows the summary statistics of fund fees by funds classified according to above specifications. The prediction was confirmed by the results shown in this table. Group (1) has the highest sales fees of 1.43% among the 4 groups. Group (1)'s sales fee ratio is also the highest. However, the average management fees (thus the average total service fees) do not show the outcomes predicted in Proposition 1. Group (1) and (4)'s management fees are the highest. This result is likely a phenomenon reflecting the difference between the reality and the model. In the model, we do not allow any differences in the quality of the fund management services. However, a fund's management fees inevitably depend on the quality (i.e., track record) of asset managers. Track record can also affect the selection of distribution channels by asset management companies, representing noise in the determination of management fees.

Table 2. Fund fees for 4 types of sales

(Unit: %)

Type of Funds	Number of Funds	Total service fees	Sales fees	Manage-ment fees	Other fees	Sales fee ratio
(1) Integrated	277	2.11	1.43	0.63	0.049	66.6%
(2) Integrated-Only	196	1.76	1.21	0.51	0.045	62.7%
(3) Independent	39	1.94	1.29	0.60	0.050	64.0%
(4) Non-Affiliated	177	2.02	1.34	0.63	0.051	63.2%

(1) Integrated Funds: All affiliated and non-affiliated or independent sellers are registered as distributors

(2) Integrated-Only Funds: Only affiliated sellers are exclusively registered as distributors

(3) Independent Funds: Only independent sellers are registered as distributors

(4) Non-affiliated Funds: Only non-affiliated (including independent) sellers are registered as distributors

C. Regressions

We ran regressions to test the predictions more rigorously. The dependent variable is either the sales fees or the sales fee ratio. The explanatory variables include dummies representing the classification of funds: integrated, integrated only, independent, and non-affiliated. These dummies were included separately for the regression. The explanatory variables also include a dummy variable showing whether a channel is a bank and dummies for performance rankings.[15] These dummy variables were added to control for the sales power of banks and the differences in the performances of asset management companies. Table 3 summarizes the estimation results. The R square value is low, partially because the characteristic variables for individual funds are not included. However, the focus is on the significance of the coefficient for each explanatory variable, not on the overall explanatory power of the estimation. Table 3 shows that either the level or the ratio of sales fee are higher for the group (1) Integrated, and these are statistically significant. For others, the coefficient is not statistically significant. The coefficients of the sales fees dummy for the group (3) Independent are negative, confirming the prediction of the model, but these are statistically insignificant. This may be due to the fact that there are only 39 samples in that group.

Table 4 shows the results when the dummies for the fund groups were included simultaneously. The results are similar to Table 3; both the level and the ratio of sales fee are higher for the group (1) Integrated. In addition, the results rejected the null hypothesis that the sales fees and the sales fee ratios are the same for the groups (1) and (3).

[15] We classified asset management companies into 4 groups according to their performance in the previous year. The funds in the top 25% were assigned number one as dummy value and the funds in the bottom 25% were assigned number four. Funds with no evaluation record were assigned number five.

Table 3. The Determinant Factors of Fee Structure

	Dependent Variables: Sales Fee Ratio(SR_i)							
Constant	0.639***(50.23)	0.632***(83.70)	0.652***(55.27)	0.654***(75.32)	0.650***(55.66)	0.646***(88.52)	0.648***(55.88)	0.643***(91.04)
$RANK_i$	-0.001 (-0.238)		-0.002 (-0.505)		-0.001 (-0.376)		-0.002 (-0.549)	
$BANKF_i$	0.005 (0.559)	-0.004 (-0.401)	0.007 (9.728)	-0.005 (-0.432)	0.008 (0.897)	0.006 (0.607)	0.001 (1.012)	0.004 (0.392)
$INTEG_i$	0.017*(1.805)	0.036***(3.431)						
$INTEG\_O_i$			-0.020 (-1.518)	-0.027** (2.193)				
N_AFFIL_i					-0.011 (-1.074)	-0.018 (-1.516)		
$INDEP_i$							0.012 (0.578)	-0.005 (-0.219)
R-Square	0.010	0.017	0.008	0.007	0.005	0.004	0.003	0.0003

$RANK_i$: The dummy variables based on quartile performance ranking of ASM for the previous year. For example, the number for top 25% ASM is one, the number for bottom 25% ASM is four. In addition, the number for non-ranked ASM is 5.

$BANKF_i$: The number is 1 if a bank is a sellers of funds (0 otherwise).

$INTEG_i$: The number is 1 if fund *i* is an integrated fund (0 otherwise)).

$INTEG\_O_i$: The number is 1 if fund *i* is an integrated-only fund (0 otherwise).

N_AFFIL_i: The number is 1 if fund *i* is a non-affiliated fund (0 otherwise).

$INDEP_i$: The number is 1 if fund *i* is an independent fund (0 otherwise).

*, **, *** is significant at the significance level of 10%, 5%, 1%, respectively. The number in parenthesis is T-Statistics.

Table 3. The Determinant Factors of Fee Structure (continued.)

	Dependent Variables: Sales Fee(SF_i)							
Constant	1.310***(22.96)	1.270***(49.99)	1.377***(26.11)	1.402***(39.55)	1.346***(25.66)	1.319***(43.88)	1.354***(26.08)	1.321***(45.50)
$RANK_i$	0.002 (0.157)		-0.001 (-0.083)		-0.002 (-0.134)		-0.0003(-0.02)	
$BANKF_i$	0.019 (0.450)	-0.001 (-0.030)	0.020 (0.483)	-0.028 (-0.634)	0.034 (0.810)	0.036 (0.841)	0.028 (0.674)	0.034 (0.822)
$INTEG_i$	0.072* (1.650)	0.160***(3.694)						
$INTEG\_O_i$			-0.137**(-2.32)	-0.191***(-3.87)				
N_AFFIL_i					0.021 (0.444)	-0.004 (-0.073)		
$INDEP_i$							-0.067 (-0.754)	-0.041 (-0.453)
R-Square	0.008	0.020	0.013	0.022	0.002	0.001	0.003	0.001

$RANK_i$: The dummy variables based on quartile performance ranking of ASM for the previous year. For example, the number for top 25% ASM is one, the number for bottom 25% ASM is four. In addition, the number for non-ranked ASM is 5.

$BANKF_i$: The number is 1 if a bank is a sellers of funds (0 otherwise).

$INTEG_i$: The number is 1 if fund *i* is an integrated fund (0 otherwise)).

$INTEG\_O_i$: The number is 1 if fund *i* is an integrated-only fund (0 otherwise).

N_AFFIL_i: The number is 1 if fund *i* is a non-affiliated fund (0 otherwise).

$INDEP_i$: The number is 1 if fund *i* is an independent fund (0 otherwise).

*, **, *** is significant at the significance level of 10%, 5%, 1%, respectively. The number in parenthesis is T-Statistics.

Table 4. Comparison of fee structure by fund type

	Dependent Variables		
	Sales Fee Ratio	Sales Fees	Management Fees
Constant	0.628*** (65.14)	1.212***(30.75)	0.509***(39.34)
$BANKF_i$	-0.006 (-0.547)	-0.035 (-0.789)	0.009 (0.646)
$INTEG_i(\lambda 1)$	0.041***(3.121)	0.240*** (4.427)	0.118*** (6.648)
$INTEG\_O_i(\lambda 2)$	-	-	-
$N\_AFFIL_i(\lambda 3)$	0.008 (0.522)	0.145** (2.448)	0.115*** (5.933)
$INDEP_i(\lambda 4)$	0.014 (0.602)	0.095 (0.994)	0.082***(2.629)
R-Square	0.018	0.029	0.084
$H_0: \lambda 1 = \lambda 3$	7.01***	3.32*	0.03
$H_0: \lambda 1 = \lambda 4$	1.43	2.41	1.36

*, **, *** is significant at the significant level of 10%, 5%, 1%, respectively. The number in parenthesis is T-Statistics.

5. Conclusion

The paper's main contribution is the provision of a theoretical model that can help explain the empirical findings regarding fund expenses and distribution channels. Using a game-theoretic model, this paper found that channels that integrate asset management companies charge higher sales fees than independent banks. In addition, an integrated asset management company has an incentive to set lower management fees than independents. This paper also found that, in certain circumstances, the equilibrium is asymmetric in the sense that the two channels' decisions on vertical integrations diverge.

This paper also contributes by providing an empirical analysis that supports the theoretical findings. The results of regressions confirm the theoretical predictions that the level and the ratio of integrated channels' sales fees would be relatively high. In addition, most of affiliated asset management companies in Korea represent a large portion of the total sales of their parent companies.

A future study comprising of an expanded number of channels may offer an interesting comparison with the results of the two-channel model of this study. A study of the recent move in the U.S. financial market (i.e., efforts to separate manufacturing jobs from financial services jobs) may be warranted as it is closely related to the topic of this paper.[16] In addition, an empirical study may be necessary to analyze data on affiliated asset management companies' representation in their parent companies' total sales.

[16] In 2006 Citigroup had decided to sell its fund operation to Legg Mason in exchange for Legg Mason's broker dealer business. In the same year, Merrill Lynch had also announced its plans to sell its asset-management operation to BlackRock, a money manager.

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