Fund expenses and vertical structures of the fund industry

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ABSTRACT

This paper provides a theoretical model on the determination of fund expenses, focusing on vertical structures of the fund industry and customer switching costs. We also empirically test our theoretical findings using data from the Korean fund market. Our first empirical finding is that a distribution channel that is integrated with an asset management company has an incentive to charge higher distribution fees than an independent channel: a vertically integrated distribution channel tends to raise the costs of rival asset management companies. Our second finding is that the equilibrium is asymmetric in certain circumstances: a channel may want to remain independent, whereas the other wants to be vertically integrated with an asset management company. Our empirical analysis showed evidence supporting the first theoretical prediction.

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1. Introduction

Funds are one of the most popular investment vehicles that individual investors use to participate in capital markets today. With the dramatic growth of the fund market, many financial firms have expanded their participation in the fund industry. For example, the banking industry has evolved from traditional financial intermediation toward a fee-based industry including the business of mutual fund distribution. More importantly, many financial firms have asset management companies (AMCs) as subsidiaries. A vast body of evidence suggests that these vertically integrated financial firms push their own or their subsidiaries’ products over alternatives. These trends are very likely to impact the determination of fees and other behaviors in the fund industry. We believe that the trends are closely related with empirical findings in the previous literature. First of all, the average expense ratio of funds has increased with the growth of the fund market and this rise in the expense ratio is attributable primarily to the increase in distribution fees and other marketing expenses. According to Bogle (2005), the average expense ratio of the 25 largest fund managers in the US increased to 1.56% in 2004 from 0.76% in 1945. Houge and Wellman (2007) and Dukes et al. (2006) reported an expense ratio increase in load funds and in funds with 12B-1 fees, respectively. Moreover, the proportion of distribution fees in total expenses has increased in comparison to management fees.

What is the reason for this increase in distribution channel expenses? An answer can be found in various empirical findings that marketing activities can increase fund sales. Sirri and Tufano (1998), Jain and Wu (2000), Nanda et al. (2005), Barber et al. (2005), and Huang et al. (2007) found that there is non-price competition in the fund industry and unsophisticated investors might rely on distributors’ reputations, advertisement, and other marketing activities for their decisions. If there are economies of scale in the fund industry, even sophisticated investors will follow the unsophisticated investors

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3 Even Charles Schwab, which has proclaimed its “independence from conflicts of interest so common on Wall Street” in many advertisements, was reported to have placed four of its own funds on its “short list” of 20 funds. (Aaron Lucchetti, “Schwab Gives Own Funds Top Billing — Brokerage Firm’s ‘Short List’ Includes 4 of Its Portfolios, Raising Concerns of Conflict,” by Wall Street Journal, September 3, 2002.)

4 Khorana et al. (2009) reported that the weight of management fees was only 44.4% of total fees in US, even when excluding load for sales.
5 In contrast to distribution fees, management fees have been reported to negatively influence fund flows. Wahal and Wang (2011) proposed that price competition was strong in management fees. As a result, total fees can negatively impact fund flows.
6 Recently Gil-Bazo and Ruiz-Verdu (2009) found that funds with worse before-fee performance charge higher fees. They explain this negative relation as the outcome of strategic fee-setting by mutual funds in the presence of investors with different degrees of sensitivity to performance.
toward the effective marketers. The rapid increase in expenses to distribution channels can be thought of as a result of increases in marketing activities.

There is another possible reason that distribution channels have increased marketing fees: it is possible that they are also increasing profit margin above marketing costs. Besides marketing activities, distribution channels usually have many ways to attract investors. For example, banks, one of the most important distribution channels, operate networks of branches or ATMs to provide payment and settlement, and other services. Although it is costly to establish and manage these networks, they help banks by increasing customer loyalty. Loyalty means the customers are locked in to the banks and they have to shoulder substantial costs in switching to other financial service providers. These switching costs can be used strategically by the banks in pricing other services such as distribution of funds. As a result, the distribution fees can be set higher than marketing and other related costs.

We can find much indirect evidence about the market power of distribution channels in the fund industry. There are several empirical findings that distribution channels do not seem to deliver sufficient benefits to investors. Bergstresser et al. (2009) found that compared with direct-sold funds, broker-sold funds deliver lower risk-adjusted returns. Christoffersen et al. (2013) analyzed mutual funds’ flows and the incentives of the brokers intermediating them. They found unaffiliated brokers bring not only more competition for inflows on price, but also more competition on past performances. Lesseig et al. (2005) noticed the ownership of the asset management company as an important determinant of expenses. They found that funds operated by financial firms generate savings from fund administration, but pass only a portion of these savings to investors. Using data from Finland, Korkeamaki and Smythe (2004) found that funds managed by banks charge higher expenses but investors are not compensated by higher risk-adjusted returns. Korpela and Puttonen (2006) reported findings 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 perform better.

This paper examines the strategic pricing of distribution channels. We are especially interested in the effects on fund expenses of customer switching costs and vertical structures of asset management companies and distribution channels. Most previous studies have explained the incentives from switching costs and vertical structures of asset management companies by asset management companies’ strategic behaviors. Our approach can expand on this understanding of the fund industry by including distribution channels into the analysis. Based on an extensive review of the literature, we believe our paper provides the first theoretical approach to this issue.

Our main finding is that a distribution channel, integrated with an asset management company, sets higher distribution fees than an independent channel. Through higher distribution fees, the integrated distribution channel helps its affiliated asset management company compete against other asset management companies: it raises the costs of rival asset management companies. The integrated asset management company has cost advantage because the raised distribution fee does not lead to an increase in its costs. The net impact is neutral since higher distribution expenses for the affiliated fund translate directly into increased profits for the distribution channel. Consequently, the integrated asset management company provides more amount of asset management service compared to non-affiliated funds.

Another interesting finding from our model is that there is an asymmetric equilibrium in the game of two competing distribution channels. In this equilibrium, one channel wants to be vertically integrated with an asset management company, while the other channel wants to remain independent.

The game theoretic model in this paper is similar to those in the vertical integration literature, especially Salinger (1988). Although Salinger’s paper is a canonical one on the issue of the incentives of raising rivals’ costs, it is far from the reality of the fund industry. In Salinger’s model, vertically integrated firms decide only whether to foreclose the upstream market or not. Therefore, only two extreme outcomes are possible. In contrast, our model allows distribution channels to sell funds of non-affiliated asset management companies. Since the distribution channels in our model can raise the distribution fees arbitrarily high or set the fees at zero, our model includes the two extreme outcomes posited by Salinger and all other possibilities in between. Another difference in our model in relation to Salinger’s is the existence of switching costs. Switching costs delay the shift (induced by increased fees) of investors to other distribution channels.

We also test our theoretical predictions using data from the Korean fund market and find empirical evidence supporting our first theoretical argument. The following section presents the model. Section 3 analyzes the equilibrium of the game. An empirical test is provided in Section 4. Section 5 discusses the conclusion.

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. Since we are interested in the determination of sales fees, we assume price competition between distribution channels, a Bertrand model. In the downstream market, however, we assume pure quantity competition among asset management companies, a Cournot model. If more than two asset management companies play a Bertrand game, the result will be that the asset management fees are equal to their costs. As is widely known, a Cournot game in the downstream market includes a Bertrand game as an extreme case. In addition, these assumptions are closer to the real market situations.

We also assume that there are no direct sales of funds to end investors by asset management companies. This assumption enables us to focus on the strategic behavior of distribution channels. 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. All of the asset management companies are assumed to sell their funds through both channels. The demand functions facing the two distribution channels are as follows:

\[ q_1 = 1 - ap_1 + b(p_2 - p_1); \quad q_2 = 1 - ap_2 + b(p_1 - p_2), \]  

where \( a + b > 0 \), \( q_1 \) is the quantity of funds sold by Channel 1, and \( q_2 \) by Channel 2. The total fees for a unit of fund sold by Channel 1 and

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7 Lesseig et al. use the term “fund company” in their paper. In Korea and in this paper, we use the term “asset management company.” The two terms have the same meaning.

8 For a survey of the papers on vertical integration, refer to Rioridan (2008). Bolton et al. (2007) also use a game-theoretic model to analyze the incentives of banks as financial service providers. However, they are interested not in banks’ pricing but in banks’ incentives to reveal their private information.

9 Further analysis using a more global data set is needed to verify our second theoretical argument.

10 At the end of 2012, there are 85 asset management companies in the Korean fund market. The number of banks is 13 (7 nationwide banks and 6 local banks). The nationwide banks have longer history, better reputations and overwhelmingly more branches. As a result, nationwide banks have market power and are influential on fund prices (total fees).

11 It is possible that a vertically integrated asset management company can strategically choose single-homing in order to expand its affiliated distribution channel’s market share. We are grateful to an anonymous referee for this point. However, this possibility, if incorporated into the model, will make the model very complicated. In addition, the main source of distribution channels’ market power is their networks of branches or ATMs, not their menu of mutual funds.

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13 Since \( a + b \) represents own price elasticity, it should be positive.

14 \( \eta \) can be also interpreted as the combination of the two services, asset management and distribution.
Channel 2 are \( p_1 \) and \( p_2 \), respectively. Since the two channels charge \( f_1 \) and \( f_2 \) for their distribution services, the asset management company receives \( p_1 - f_1 \) and \( p_2 - f_2 \) for its asset management services. The last parts of the demand functions represent competition between the two channels. Parameter \( b \) reflects the sensitivity of investors to differences in fees: if switching costs of individual investors are high, then sensitivity is low. The larger that parameter \( b \) is, the more demand will shift to the rival distribution channel as a result of an increase in fund fees.

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 ex ante 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 concentrate on the issue of the relationship between sales fees and vertical integration.

The whole game is a dynamic game of complete information and consists of three stages. In the first stage, each channel decides whether to integrate an asset management company by merging with or acquiring it. In the next stage, the two channels announce their own sales fees, \( f_1 \) and \( f_2 \). These fees are imposed to each unit of fund 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 of asset management service. Thus the equilibrium concept of this game is a subgame perfect Nash equilibrium, and therefore the resulting strategy profile induces a Nash equilibrium on every subgame.

Since the two channels are distributing all funds, each asset management company decides on the provision of service 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 \( j = 1, 2, \ldots, n \). As a result, total fund sales through the two channels are as follows:

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

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

### 3. Equilibrium analysis

The entire game is a type of a dynamic game of complete information. Therefore, backward induction is applied to find the equilibrium of the game.\(^{15}\) However, for the convenience of equilibrium analysis, we examine the second and the third stage equilibrium first. Certainly these equilibrium analyses should be done for each possible case where the two distribution channels decide on integrating mutual fund in the first stage.

The decisions of the two distribution channels in the first stage will produce three cases: (1) when both channels are independent, (2) when a channel is integrated and the other is independent, and (3) when both channels are vertically integrated. Hereafter, we analyze the equilibrium prices and profits for each case and then find the equilibrium of the first stage in Section 3.4.

#### 3.1. When both channels are independent

First, we consider the equilibrium prices and profits when neither channel integrates the asset management companies. In this case, channel \( i \)'s profit function is defined as the product of the total funds distributed through \( i \) and the distribution fee, \( f_i \):

\[
\Pi_i = f_1 \sum_{j}^{n} q_{1j} + f_2 \sum_{j}^{n} q_{2j},
\]

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 \( p_2 - f_2 \):

\[
\pi_j = (p_1 - f_1)q_{1j} + (p_2 - f_2)q_{2j}, \quad j = 1, 2, \ldots, n.
\]

By rearranging Eq. (1), \( p_1 \) and \( p_2 \) can be expressed as a function of \( \sum_{j}^{n} q_{1j} \) and \( \sum_{j}^{n} q_{2j} \):

\[
\begin{align*}
p_1 &= \frac{1 - (a + b)f_1}{1 + n}q_{1j} + \frac{1 - (a + b)f_2}{1 + n}q_{2j}, \quad j = 1, 2, \ldots, n. \\
p_2 &= \frac{1 - (a + b)f_1}{1 + n}q_{1j} + \frac{1 - (a + b)f_2}{1 + n}q_{2j}.
\end{align*}
\]

Now, the method of backward induction is applied. The equilibrium quantities in the third 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 Eq. (4) are inserted into the profit functions in Eq. (3), the profit maximization problem with respect to \( q_{1j} \) and \( q_{2j} \) will yield:

\[
q_{1j} = \frac{1 - (a + b)f_1}{1 + n}q_{1j} + \frac{1 - (a + b)f_2}{1 + n}q_{2j}, \quad j = 1, 2, \ldots, n.
\]

In Eq. (5), equilibria \( q_1 \) and \( q_2 \) are the functions of \( f_1 \) and \( f_2 \). To solve the second stage, Eq. (5) is plugged into Eq. (2) so that each channel's profit function is expressed as a function of \( f_1 \) and \( f_2 \) as follows:

\[
\Pi_1 = \frac{n(a + b)}{(1 + n)(2a + b)^2} \Pi_2.
\]

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:

\[
\Pi_1 = \frac{n(a + b)}{(1 + n)(2a + b)^2} \Pi_2.
\]

In the above equations, parameters \( a \) plus \( b \) capture own price elasticity of end investors. In particular, demand \( q_1 \)’s own price elasticity is \( a + b \), and cross price elasticity is \( b \). In Eq. (7), the profits of channels decrease as price elasticity becomes greater. This is because it becomes more difficult for channels to raise their fees if investors become more sensitive to the fees charged. When there are more asset management companies, the channels' profits increase because the effects of double marginalization\(^{16}\) decrease. Using the equations in (7), asset management company \( j \)'s profit function is expressed as follows:

\[
\pi_j = \frac{2(a + b)^2}{a(2a + b)^2(1 + n)^2}.
\]

\(^{15}\) For a detailed explanation about backward induction, refer to Fudenberg and Tirole (1991).

\(^{16}\) Double marginalization is the exercise of market power at successive vertical layers in a supply chain. The sequence of mark-ups leads to a higher retail price and lower combined profit for the supply chain that would arise if the firms were vertically integrated.
3.2. When only one channel is integrated

Without 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. Channel 1 needs to take a fixed cost \( F \) to merge with asset management company 1. The cost of merging, \( F \), can be thought of as the net present value of asset management company 1’s future profits. In our model, asset management companies play a Cournot game and all of them make positive profits unless there are infinitely many players. In addition, one can imagine that it is costly to consolidate two firms under a single umbrella. The M&A decision of channels implies that the profit increment is greater than the fixed integration cost, \( F \), which should be paid as an up-front sunk cost. Even after the integration, Channel 1 sells the funds of every asset management company. Moreover, Channel 1 imposes the same sales fees to all of the funds it distributes in accordance with regulations of the competition authority. Channel 2 distributes funds in the same manner as in Section 3.1.

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

\[
\Pi_1 = f_1 \left( \sum_{j \neq 1} q_{1j} \right) + p_1 q_{11} + (p_2 - f_2) q_{21} - F. \tag{9}
\]

In Eq. (9), Channel 1 receives sales fees from all of the asset management companies and management fees from \( q_{11} \). It also collects management fees from \( q_{1j} \) which is distributed by Channel 2. 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 Section 3.1. The equilibrium is asymmetric, and the equilibrium quantities in the final stage are as follows:

\[
q_{1j} = \frac{1 - 2(a + b) p_2 f_j + b f_j}{1 + n}, \quad q_{11} = \frac{1 - (a + b) f_2 + b f_1}{1 + n}, \quad \text{for all } j \text{ except for } j = 1 \tag{10}
\]

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

The magnitudes of \( q_{11} \) and \( q_{21} \) are bigger than \( q_{11} \) and \( q_{22} \) if \( n \) is greater than 2. This reflects an asymmetric competitive structure between the integrated and the independent asset management companies.

The second stage is solved as described in Section 3.1, and the equilibrium prices are as follows:

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

\[
p_1 = \frac{1 + a f_1 n - a f_j n}{a(1 + n)}, \quad p_2 = \frac{1 + a f_2 n}{a(1 + n)}. \tag{13}
\]

In Eq. (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 is integrated, 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 \( (p_1^* - p_2^* < p_1^* - p_2^*) \).

The intuition behind **Proposition 1** is that it can be beneficial for the integrated Channel 1 to raise its sales fees. The rise in Channel 1’s sales fees means an increase in the costs of all the asset management companies. However, the rise does not discourage asset management company 1. Hence, Channel 1’s subsidiary asset management company produces more output, the asset management service, than its rivals, increasing its market share in \( q_1 \). Although raising \( f_1 \) can decrease the sales fee revenue of Channel 1, the increase in the management fee revenue from the increased market share might be bigger than this decrease. Plugging \( f_1^*, f_2^*, p_1^* \) and \( p_2^* \) into the players’ profit functions yields the following:

\[
\Pi_1 = \frac{1}{a(1 + n)^2 (4a^2 n + 8ab n + b^2 (1 + 3n))^2} \times \left\{ 2b^2 (1 + 3n)^2 + 4a^2 n^2 (2 + 2n + n^2) + 4a^3 b n (1 + 10n + 8n^2 + 4n^3) \right. \\
+ ab^3 (3 + 26n + 60n^2 + 18n^3 + 9n^4) \\
+ a^2 b (1 + 18n + 74n^2 + 42n^3 + 21n^4) \right\}
\]

\[
\Pi_2 = \frac{(a + b) n (2a + b - 1 + 3n))^2}{(1 + n) (4a^2 n + 8ab n + b^2 (1 + 3n))^2},
\]

\[
\Pi_j = \frac{(a^2 + 3ab + 2b^2) (b + 2an + 3bn)}{a(1 + n)^2 (4a^2 n + 8ab n + b^2 (1 + 3n))^2} \text{ for } j = 2, \ldots, n.
\]

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 integration is good for Channel 1. 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 Fig. 1 illustrates the changes in profits across \( n \), the number of asset management companies, running from 3 to 20 when \( a = b = 1 \). The second panel illustrates the changes when \( a = 1 \) and \( b = 1/10 \), and the last panel shows the changes when \( a = 1/10 \) and \( b = 1 \).

Channel 1’s profits decrease when the number of asset management companies increases, whereas Channel 2’s profits increase. This is because fiercer 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 Fig. 2, Channel 2’s profits after the integration of Channel 1, the red curve, is uniformly under the black curve, its profits before the integration.

3.3. When both channels decide to integrate

If both channels decide to integrate asset management companies, they have the same profit functions. Independent asset management companies’ profit functions can be derived in the same way as before. These profit functions are obtained from modifying Eqs. (3) and (9):

\[
\Pi_1 = f_1 \left( \sum_{j \neq 1} q_{1j} \right) + p_1 q_{11} + (p_2 - f_2) q_{21} - F, \tag{14}
\]

\[
\Pi_2 = f_2 \left( \sum_{j \neq 2} q_{2j} \right) + p_2 q_{22} + (p_1 - f_1) q_{12} - F
\]

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

\[17 \text{ Remember that the term } f_1 \times q_{11} \text{ disappears from the profit function of the integrated Channel 1.}
\]

\[18 \text{ This result is robust to a wide range of the values of parameters } a, b \text{ and } n: \quad a \times b \times n = [0.0, 1, 0.2, \ldots, 1] \times [0.0, 1, 0.2, \ldots, 1] \times [3, 4, \ldots, 300]. \]
The application of the backward induction results in the following equilibrium prices:

\[ f_1/C_3 = f_2/C_3 = n^2 + 2n - 3 \]
\[ p_1/C_3 = p_2/C_3 = a(2n^2 + 2n - 3) + b(1 + n) \]
\[ = f_1/C_0/C_1 + b(1 + n) \]

3.4. Equilibrium of the first stage game

The analysis up to now can be summarized in the following payoff matrix, which the two channels face in the first stage of the game (Table 1). In this stage, each channel has two options: “Integrate” or “Do Not Integrate.” The superscript on a profit function \( \Pi \) represents the last number of the relevant subsection. For example, \( \Pi_{NI}^{1} \) is the profit for a channel when the two channels decide to be independent as in Section 3.1 of this paper. If only one channel decides to integrate as in Section 3.2, its profits will be \( \Pi_{I}^{2} - F \), and the non-integrated channel profits will be \( \Pi_{NI}^{2} \).

Now the whole game boils down to a simultaneous-move game at the 1st stage where the two distribution channels decide on whether to integrate. Its equilibrium depends on the relative magnitude of \( F \), the fixed costs for integration. If \( F \) is small enough, both channels would always want to integrate. In contrast, 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 \( n = 5 \), for example. Then, the payoff matrix changes into that in Table 2.

In this situation, if \( F = 0.08 \), the subgame-perfect Nash equilibria are the sets of (Integrate, Do Not Integrate) and (Do Not Integrate, Integrate). Fig. 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 extensive game is asymmetric in the sense that one distribution channel decides to integrate an asset management company, while the other channel wants to remain independent.

It is noticeable that 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 sufficiently low, the payoffs from mimicking the rival’s vertical integration, \( \Pi_{I}^{2} - \Pi_{NI}^{2} \), are greater than the benefits of the first mover, \( \Pi_{I}^{1} - \Pi_{NI}^{1} \). Therefore, there are only two kinds of equilibria: both integrate, or both do not integrate.

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19 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).
4. Empirical test

We perform empirical tests of the theoretical predictions in Proposition 1. Although the second proposition regarding asymmetric equilibrium has some value for theoretical approaches, it is difficult to verify empirically. In particular, the integration cost $F$ in the actual fund industry is hard to compare across countries and we leave the empirical test of Proposition 2 as a future research topic. In this section we focus on the effects of vertical structures on the expenses to distribution channels and asset management companies.

There is another interesting point for further empirical analysis. According to our model, a vertically integrated asset management company can sharply increase its market share thanks to the help of its affiliated distribution channel. Although we do not have sufficient data to empirically test this theoretical argument, most of the affiliated asset management companies in Korea represent large shares in their parent channels’ total sales. For example, 42.4% of the funds sold by all distribution channels in 2009 were those of their affiliated asset management companies. The ratio was 50.4% in 2008.

4.1. Data

We use data from the Korean fund market for our empirical tests.20 Korea has a relatively big fund market and its data are good for the empirical tests of our first theoretical predictions because direct sales of funds by asset management companies are negligible in Korea.21

Our empirical analysis concentrates on pure equity funds, excluding bond funds and money market funds (MMFs) from the data set. Bond funds are usually sold to institutional investors which are much less dependent upon distributor network or reputation. MMFs are excluded because their returns are not significant enough for the fee structure to be differentiated by distributors. Among equity funds, privately placed funds and index funds are also excluded from our data set for similar reasons.

The data set covers all equity funds launched from January 2002 to December 2009. We included all funds created during this period so as to remove survivorship bias. This left a total of 1111 funds, which contain both load and no-load funds. Considering that the average holding period of equity funds is one year in Korea, we define sales compensation (SC) as the sum of sales fees22 and sales commissions. We also conducted empirical tests using the data set from which load funds are excluded. The results were qualitatively the same as the results reported in this paper.

4.2. Summary statistics

Table 3 summarizes the annual expenses for the funds in the data set. The average total expenses are 2.07%. The sales compensations (SC) are 1.41%, representing 67.4% of the total expenses. Compared to investors in other countries, Korean fund investors tend to pay higher total fees as well as paying a higher proportion of fees to distribution channels (refer to Khorana et al. (2009)).

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20 We obtained the data set from Zeroin, the leading fund rating agency in Korea.
21 Korean asset management companies were forbidden from selling their funds directly to investors. Although they were allowed direct sales in 2006, they still have difficulties in establishing buyer networks and other marketing activities. As a result, the ratio of direct sales in total fund sales was just 0.95% in 2010.

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The actual fee structures in the market are different from those in the theoretical model. In Section 2, each asset management company runs just two funds, e.g.,  and  for company  . In the real world, however, an asset management company runs various funds that are sold through many distribution channels. We classify the samples in our data set into four groups: (1) Integrated, (2) Integrated-only, (3) Independent, and (4) Non-affiliated.23 The first group, (1) Integrated, is the group of funds managed by vertically integrated asset management companies and sold through various channels including the integrated channel. Next, (2) Integrated-only is the set of funds managed by vertically integrated asset management companies and sold only through the integrated channels. The third group, (3) Independent, is the set of funds sold through independent distribution channels only. Lastly, (4) Non-affiliated is the set of funds sold by vertically integrated asset management companies and sold through non-affiliated channels including independent but excluding the integrated channels themselves.

Among these four groups, the first group, (1) Integrated, is the closest to the funds managed by the integrated asset management companies in our model, i.e. . The third group, (3) Independent, represents the funds sold by the independent distribution channel, i.e. . Note that in the case of Group (4) Non-affiliated, the distribution channels do not have strong incentives to raise their sales fees in order to increase the costs of rival asset management companies. In this regard, a comparison between (1) and (4) can be a topic of empirical analysis as well as a comparison of (1) and (3). Funds in Group (2) are foreclosed by the integrated asset management companies, not by the integrated distribution channels, in a manner of non-price competition. This case is not captured by our theoretical model and will not be addressed in the following empirical analysis.

Table 4 shows the summary statistics of fund expenses by funds classified according to above specifications. As predicted in Proposition 1, Group (1)’s management fees are lower than Group (3) and (4)’s. Group (1)’s total expenses are lower than Group (3)’s as predicted in Proposition 1. However, Group (1)’s total expenses are slightly higher than Group (4)’s, which is the only contradiction to our predictions.

### 4.3. Regressions

We run regressions to test the predictions more rigorously, using the data of Groups (1) and (3). The dependent variable is either the SC or the SC ratio, which is the portion of SC in the total expenses. The explanatory variables are management fees and a dummy, which is set to one if the fund belongs to Group (1) and zero otherwise. We also include the dummies for performance rankings of asset management companies as explanatory variables because the track records of asset management companies can affect the fees.24 We conduct fixed-effect panel regressions, using the above explanatory variables and the dummies.

Table 5 summarizes the estimation results. The coefficient estimates of the dummy representing Group (1) are statistically significant and positive in all regressions. These results suggest that both the level and the ratio of SC are significantly higher for Group (1) than for Group (3), and confirm the prediction of the model. On the other hand, the SC is estimated to be proportional to management fees in absolute level. The SC ratio is inversely correlated with management fees. The track record dummies of asset management companies are also statistically significant and positive.

We perform another regression analysis by changing dependent variables from SC and SC ratio to management fees and total expenses. The explanatory variables are SC and the same dummies. According to the results in Table 6, the management fees are significantly lower for Group (1) than for Group (3), implying that the integrated asset management companies are enabled to achieve bigger market shares.

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23 Usualy, a fund’s provisions include information about its distributors and the asset management company. We used this information for this classification.

24 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 for the dummy value and the funds in the bottom 25% were assigned number four. Funds with no evaluation record were assigned number five.

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### Table 3
Fund expense for equity type funds.

<table>
<thead>
<tr>
<th>Launched year</th>
<th>Number of funds</th>
<th>Total expenses</th>
<th>Sales compensation</th>
<th>Management fees</th>
<th>Other fees</th>
<th>SC ratios(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>99</td>
<td>1,860</td>
<td>1,293</td>
<td>0.514</td>
<td>0.055</td>
<td>68.4</td>
</tr>
<tr>
<td>2003</td>
<td>86</td>
<td>2,138</td>
<td>1,573</td>
<td>0.524</td>
<td>0.041</td>
<td>72.3</td>
</tr>
<tr>
<td>2004</td>
<td>77</td>
<td>2,241</td>
<td>1,648</td>
<td>0.549</td>
<td>0.045</td>
<td>71.6</td>
</tr>
<tr>
<td>2005</td>
<td>123</td>
<td>2,190</td>
<td>1,484</td>
<td>0.656</td>
<td>0.049</td>
<td>67.3</td>
</tr>
<tr>
<td>2006</td>
<td>112</td>
<td>2,022</td>
<td>1,370</td>
<td>0.605</td>
<td>0.047</td>
<td>66.6</td>
</tr>
<tr>
<td>2007</td>
<td>259</td>
<td>2,154</td>
<td>1,433</td>
<td>0.673</td>
<td>0.046</td>
<td>65.9</td>
</tr>
<tr>
<td>2008</td>
<td>143</td>
<td>2,033</td>
<td>1,367</td>
<td>0.617</td>
<td>0.049</td>
<td>66.5</td>
</tr>
<tr>
<td>2009</td>
<td>212</td>
<td>1,962</td>
<td>1,313</td>
<td>0.601</td>
<td>0.048</td>
<td>66.5</td>
</tr>
<tr>
<td>Total</td>
<td>1,111</td>
<td>2,071</td>
<td>1,414</td>
<td>0.609</td>
<td>0.074</td>
<td>67.4</td>
</tr>
</tbody>
</table>

\(^4\) SC ratio = (sales compensation / total expenses) × 100%.

### Table 4
Fund charges for 4 types of sales.

<table>
<thead>
<tr>
<th>Type of funds</th>
<th>Number of funds</th>
<th>Total expenses</th>
<th>Sales compensation</th>
<th>Management fees</th>
<th>Other fees</th>
<th>SC ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Integrated</td>
<td>374</td>
<td>2,114</td>
<td>1,454</td>
<td>0.615</td>
<td>0.044</td>
<td>68.0</td>
</tr>
<tr>
<td>(2) Integrated-only</td>
<td>377</td>
<td>1,990</td>
<td>1,365</td>
<td>0.577</td>
<td>0.047</td>
<td>67.4</td>
</tr>
<tr>
<td>(3) Independent</td>
<td>68</td>
<td>2,144</td>
<td>1,435</td>
<td>0.661</td>
<td>0.048</td>
<td>66.6</td>
</tr>
<tr>
<td>(4) Non-affiliated</td>
<td>294</td>
<td>2,105</td>
<td>1,422</td>
<td>0.632</td>
<td>0.051</td>
<td>66.9</td>
</tr>
</tbody>
</table>

(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.
The determinants of fee structure: Integrated group vs. independent group.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Dependent variable: Sales compensation</th>
<th>Dependent variable: SC ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>75.274(23.40)</td>
<td>0.767(140.85)</td>
</tr>
<tr>
<td>Management fee</td>
<td>1.033(25.62)</td>
<td>−0.002(−22.69)</td>
</tr>
<tr>
<td>INTEG</td>
<td>6.623(3.37)</td>
<td>0.008(2.52)</td>
</tr>
<tr>
<td>1stRank</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>2ndRank</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>3rdRank</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>4thRank</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>R-square</td>
<td>0.157</td>
<td>0.133</td>
</tr>
</tbody>
</table>

*Sales compensation, management fees and total expenses are calculated in terms of basis point.

The determinants of fee structure: Integrated group vs. independent group.

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Dependent variable: Management fee</th>
<th>Dependent variable: Total expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>44.162(40.13)</td>
<td>53.289(43.55)</td>
</tr>
<tr>
<td>SC</td>
<td>0.155(25.61)</td>
<td>1.143(184.07)</td>
</tr>
<tr>
<td>INTEG</td>
<td>−4.827(−6.41)</td>
<td>−4.839(−6.21)</td>
</tr>
<tr>
<td>1stRank</td>
<td>−</td>
<td>−2.155(−2.48)</td>
</tr>
<tr>
<td>2ndRank</td>
<td>−</td>
<td>−2.627(−2.90)</td>
</tr>
<tr>
<td>3rdRank</td>
<td>−</td>
<td>−4.187(−4.76)</td>
</tr>
<tr>
<td>4thRank</td>
<td>−</td>
<td>−7.230(−7.99)</td>
</tr>
<tr>
<td>R-square</td>
<td>0.165</td>
<td>0.906</td>
</tr>
</tbody>
</table>

*Sales compensation, management fees and total expenses are calculated in terms of basis point.

The determinants of fee structure: Integrated group vs. non-affiliated group.

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Dependent variable: Sales compensation</th>
<th>Dependent variable: SC ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>89.238(39.38)</td>
<td>0.783(141.73)</td>
</tr>
<tr>
<td>Management fee</td>
<td>0.838(25.12)</td>
<td>−0.002(−32.77)</td>
</tr>
<tr>
<td>INTEG</td>
<td>4.652(4.18)</td>
<td>0.008(4.08)</td>
</tr>
<tr>
<td>1stRank</td>
<td>−0.654(−0.37)</td>
<td>0.005(1.29)</td>
</tr>
<tr>
<td>2ndRank</td>
<td>3.735(2.02)</td>
<td>0.007(1.92)</td>
</tr>
<tr>
<td>3rdRank</td>
<td>5.837(3.16)</td>
<td>0.015(4.06)</td>
</tr>
<tr>
<td>4thRank</td>
<td>1.021(0.05)</td>
<td>0.003(0.71)</td>
</tr>
<tr>
<td>R-square</td>
<td>0.107</td>
<td>0.172</td>
</tr>
</tbody>
</table>

*Sales compensation, management fees and total expenses are calculated in terms of basis point.

The determinants of fee structure: Integrated group vs. non-affiliated group.

<table>
<thead>
<tr>
<th>Table 8</th>
<th>Dependent variable: Management fee</th>
<th>Dependent variable: TER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>45.245(57.60)</td>
<td>53.493(60.83)</td>
</tr>
<tr>
<td>SC</td>
<td>0.126(25.12)</td>
<td>1.118(219.63)</td>
</tr>
<tr>
<td>INTEG</td>
<td>−2.090(−4.84)</td>
<td>−2.229(−5.07)</td>
</tr>
<tr>
<td>1stRank</td>
<td>−1.950(−2.89)</td>
<td>−1.576(−3.07)</td>
</tr>
<tr>
<td>2ndRank</td>
<td>−1.098(1.53)</td>
<td>−1.687(−2.48)</td>
</tr>
<tr>
<td>3rdRank</td>
<td>−1.821(−2.55)</td>
<td>−1.574(−2.32)</td>
</tr>
<tr>
<td>4thRank</td>
<td>−6.124(−8.25)</td>
<td>−6.650(−9.42)</td>
</tr>
<tr>
<td>R-square</td>
<td>0.108</td>
<td>0.901</td>
</tr>
</tbody>
</table>

*Sales compensation, management fees and total expenses are calculated in terms of basis point.

The number is 1 if fund i is an integrated fund (0 if fund i is an independent fund).

The dummy variables based on quartile performance ranking of AMCs for the previous year. For example, if an AMC is included in top 25% performance, 1st rank dummy value is one (0 otherwise), and so on. If an AMC is non-ranked, the dummy variable is always 0.
Moreover, the results show that total expenses of Group (1) are lower than those of Group (3) after controlling for the positive relationship between management fees and sales compensation. These results correspond with the predictions in the theoretical model which suggests that the integrated channel should charge lower total fees than the sum of the sales fee of the independent channel and the management fee of independent asset management companies.

As a robustness check, we repeat the same regressions as in the analysis up to now, using the data of Groups (1) and (4). This repetition reflects that the number of funds for Group (3) is relatively small. Since the distribution channels of funds in (4) have incentives similar to those of independent channels as mentioned earlier, the estimation results should be similar to those in the previous empirical analysis. The dependent and explanatory variables are exactly the same and we change only the data. Table 7 shows the results when the dependent variables are SC or SC ratio. One can check that the estimation results are almost the same, with the exception that the coefficient estimates of some performance ranking variables are not statistically significant. Table 8 matches Table 6 showing the results when the dependent variables are management fees or total expenses. Again these results are almost the same as in Table 6.

Lastly, though not captured in the theoretical model, we compared the fee structures of Groups (1) and (2) (Table 9). Group (1) charges more SC than Group (2). However, the management fees for Group (1) are higher than those for Group (2).

5. Conclusion

The paper’s main contribution is the provision of a theoretical model that can help explain the empirical findings in Korea regarding fund expenses and distribution channels. Using a game-theoretic model, this paper predicts that a channel integrated with an asset management company charges higher sales fees than an independent channel. This paper also theorizes that, in certain circumstances, the equilibrium is asymmetric in the sense that the two channels’ decisions on vertical integration diverge.

Our empirical evidence strongly supports the first set of theoretical predictions. The results of regressions confirm the theoretical predictions that the level and the ratio of integrated channels’ sales fees would be relatively high. Moreover, management fees of integrated asset management companies turned out to be higher than those of independent ones. The evidence is also consistent with the theoretical prediction that most affiliated asset management companies in Korea represent a large portion of the total sales of their parent channels.

The findings and evidence in this paper suggest several areas of future research and analysis. 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. Another potential research topic is theoretical models that include independent financial advisors and/or asset management companies enabled to sell their funds directly. These models are interesting, but they are much more complex to calculate the equilibrium and are beyond the scope of this paper. A study of the recent regulatory and M&A moves in the U.S. financial market (i.e., efforts to separate asset management services from distribution services) is also interesting and it is closely related to the topic of this paper. In addition, an empirical study can be conducted to analyze data on affiliated asset management companies’ shares in their parent companies’ total sales.

References