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Systems Thinking Perspective on the Sustainable Growth Strategy of Hedge Funds Market

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Abstract

This study explores hedge fund characteristics that affect hedge fund performance, namely, fund size, fund age, and performance fee. Previous studies have examined relationships between hedge fund characteristics and fund performance using singular and static thinking to report inconsistent findings without providing full understanding of the causal relationships among variables.

To identify that comprehensive causal relationships between hedge fund characteristics and hedge fund performance, this research applies the system dynamics perspective, which allowed demonstration of the interactions within the overall system beyond the singular causal relationships between hedge fund characteristics and performance found in existing traditional research.

This study contributes to existing literature in the following ways. First, it overcomes the limitations of singular research methodologies by looking at the integrated system of hedge fund characteristics and fund performance from a bird's eye view based on their dynamic feedback relationships. Second, policy suggestions in terms of regulation and education are presented as growth strategies for the sustainable development of the Korean hedge fund market.

Keywords: Fund Size, Fund Age, Performance Fee, Hedge Funds Characteristics, Fund Performance, Causal Loop Diagram, Systems Thinking

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I. Introduction

Hedge funds were first introduced in Korea in December 2011 with 12 funds and 149 billion Korean won, and have been growing steadily to become 26 funds with a total asset of 4.1 trillion Korean won as of late March 2016. However, at the same time, this growth is seen as less than expected, with problems such as the use of simple investment strategies focusing on long/short, domestically focused asset management, concentration of capital flow to a few better performing hedge fund management firms, and various restrictive regulations cited as the reasons for the slow development of Korea's hedge fund market (Yi, 2016).

While hedge funds have a short history in Korea with only a few studies on the Korean hedge fund market available so far, diverse researches have and are being conducted globally on the characteristics of hedge funds, such as their performance persistence, size, age, and performance fee, as well as the relationship between hedge funds and fund performance (Dimitrios et al., 2016). Recently, Korea's National Pension started investing in hedge funds, albeit foreign hedge funds, for the first time, in order to take advantage of hedge funds' use of market inefficiencies towards greater profit (Yi, 2016). As the doors open for more potential investments on hedge funds, the Korean hedge fund market will benefit from research on the major characteristics of hedge funds and their causal relationships with hedge fund performance.

So far, existing research on hedge fund characteristics and their effect on hedge fund performance have been largely inconsistent in their findings. While there are a few studies arguing that the performance of large funds exceed that of small funds, most studies state that small funds are better performing than large funds. Also, the majority of researches found that young funds perform better than old funds, and some studies claim that there is no relationship between performance fee and hedge fund performance. This inconsistency arises from the different methodologies used in the studies in terms of research data, period, and statistical analysis method, but moreover, it shows the limitations of the singular and static analysis on the causal relationship between factors generally studied in existing literature. There are currently very few studies that look at the nonlinear causal relationship between hedge fund characteristics and performance of from a structural perspective. To analyze the causal relationships among the variables beyond conventional statistical methods, this study utilizes system dynamics for a more comprehensive look at the relationships (Eom et al., 2014:

Kim and Chung, 2015).

The application of system dynamics enables a bird's eye view of the feedback structure of the overall system of hedge fund performance and its characteristics such as fund size, age, and performance fee, so as to allow a comprehensive interpretation based on the system structure in which hedge fund characteristics and fund performance mutually interact. In addition, further analysis is made on how the increase in fund size increases market competition to cause implementation of more regulations. This exploration into the causal relationships between hedge fund performance and hedge fund characteristics is a first on the hedge fund market, and as such, has important implications that point to the need for professional education for cultivating hedge fund experts and the implementation of suitable regulations for controlling market risks in order for the Korean hedge fund market to grow sustainably.

This paper is comprised as follows. Following the introduction, Section 2 gives an overview of hedge funds and previous literature. Section 3 presents the individual causal loop diagrams for the hedge fund characteristics and fund performance, and Section 3 illustrates the comprehensive causal loop diagram based on system dynamics' dynamic causal relationship model to provide policy recommendations on the sustainable growth strategy for Korean hedge funds. Lastly, Section 5 summarizes the research results and discusses its implications.

II. Theoretical Background and Literature Review

1. Overview of Hedge Funds

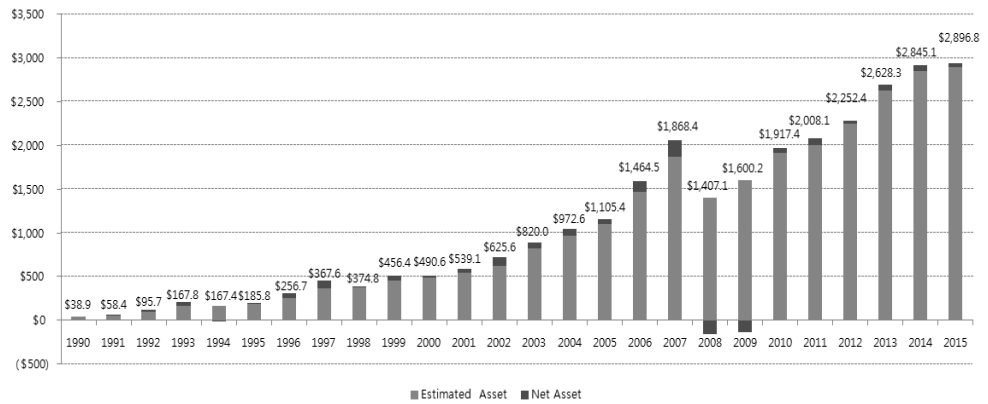
1) The Current Hedge Fund Market

The total asset of global hedge funds by the end of 2015 reached approximately US$2.9 trillion. Although a rapid decrease in assets was observed during the financial crisis of 2008, since 2010, money flow has been increasing steadily over the past six years (HFR, 2015. 4Q).

Recently the number of hedge funds is more than 10,000 globally. The growth in the hedge fund markets is due to the appreciation of assets and new money inflow to the hedge fund. We can see that during the early 2000s there was substantial growth in the hedge fund industry, reaching its peak before the financial crisis in 2008. After the 2008-9 crisis we

observe this significant growth in assets continuing (Dimitrios and Moshfique, 2016).

(Unit: million)



[Figure 1] HFR Global Hedge Fund Industry Report (2015. 4Q)

2) The Characteristics of Hedge Funds

According to The Handbook of Hedge Funds (Lhabitant, 2011), hedge funds are different from mutual funds in various ways, and utilizes various investment strategies such as short selling, derivatives, and arbitrage. Investors usually invest in hedge funds as limited partners while fund managers manage the fund as general partners. Most hedge funds attract investment capital from large-sized institutional investors or accredited investors, and hedge fund managers receive incentive fees based on fund performance.

Certain restrictions are generally imposed on hedge funds not only when starting up but also during the redemption period. Most hedge funds have a minimum investment requirement, and in case of Korean hedge funds, the minimum requirement for individual investors is usually set as 100 million Korean won[1]. In general, hedge funds operate in a closed-end form which prevents additional money flow after its startup and, unlike mutual funds, have restrictions such as lock-up period, notice period, and redemption period (Agarwal et al., 2009).

The general partner who manages the hedge fund receives performance fees based on the

1) Korea's Financial Services Commission categorizes hedge funds as professional investment-type private equity fund in accordance with the capital market law, and sets the minimum investment requirement for individual investors as 100 million Korean won (for funds with leverage ratios higher than 200%, 300 million Korean won).

performance fee contract, and the most common fee structure in the hedge fund industry is 2:20. That is, hedge fund managers receive 2% of the assets managed as management fee and 20% of fund profits above the stipulated return as incentive fee. The stipulated return is called the hurdle rate, and is usually in the form of treasury yield plus spread. Hedge fund managers can only receive incentive fees if they achieve returns above the hurdle rate, so the structure of the performance fee contract can be said to be similar to that of a option.

Another factor for incentive fees paid to the general partners is high water mark, which is a restriction that only allows general partners to collect incentive fees if they bring profits above the fund's previous high.

Due to the restrictions on investment/redemption and the performance-based fee structure, the performance of hedge funds relies on the talents of the general partners more than mutual funds. In particular, the restrictions on money flow and redemption strongly influences the continued performance of hedge funds. Hedge fund investors are unable to redeem their invested assets easily even if the fund performance is not up to par nor can they make new investments with ease. Due to these characteristics, hedge fund managers are driven to find more creative and innovative investment strategies to achieve high returns for the funds they manage (Getmansky, 2004).

2. Theoretical background and Literature Review

1) Overview

A comprehensive literature review was conducted on studies on the causal relationship between hedge fund characteristics and fund performance published in Korea and abroad since 2000. Using Google Scholar, a total of 90 papers from 30 journals were found and sorted in terms of the number of papers published and journal name in Table 1. Unfortunately, it was difficult to find studies on Korean hedge funds due to its short history. Research on the performance of hedge funds have been consistently conducted over the years, and throughout the years, have been one of the most controversial topics of research (Walter Gehin, 2007) due to the unique characteristics of hedge funds.

Hedge funds use higher risk-taking strategies compared to conventional investment methods. For the purposes of this research, hedge fund performance will comprehensively refer to the profit return (alpha) from hedge funds' investment strategies (Lhabitant, 2011), and among

the different hedge fund characteristics that affect hedge fund performance, this study will focus on the relationships between fund size and fund performance, fund age and fund performance, and performance fee and fund performance (Pertrac Corp., 2012). Review of existing literature revealed inconsistent findings on hedge fund performance and its variables due to singular and static research methodologies. Therefore, in Section 3 that follows, this research will present a bird's eye view of the overall causal feedback structure between hedge fund characteristics and fund performance using system dynamics' causal loop diagrams. These causal loop diagrams will be constructed based on the causal relationships found in previous studies to strengthen the evidential support for the causal relationship between hedge fund characteristics and fund performance as well as the objectivity of the research (Chung and Lee, 2012: Eum and Chung, 2014: Kim and Chung, 2015).

〈Table 1〉 Existing literature on Hedge Funds Performance and Its Variables (Since 2000 by published year and Journal)

Journal	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	SUM
Applied Financial Economics				1													1
Derivatives Use, Trading Regulation							1										1
Economic Review						1											1
Etc			2	2	2		1	1				3			1		12
European Financial Management									1	1						1	3
European Journal of Operational Research					1												1
Financial Analysts Journal		1			1			1		1							4
International Review of Financial Analysis																1	1
Journal of Applied Finance					1												1
Journal of Banking & Finance									1	3					1		5
Journal of Corporate Finance											1	1					2
Journal of Derivatives & Hedge Funds							1		2		1						4
Journal of Financial and Quantitative Analysis					1		1	1			1		1				5
Journal of Financial Economics				1	1		1		1	1	3	1	1	1			11
Journal of Financial Transformation								1									1
Journal of Futures Markets	1																1
Journal of International Money and Finance										1							1
Journal of Multinational Financial Management					1				1								2
Journal of Portfolio Management							1		1								2
Journal of Wealth Management				1													1
Quarterly Journal of Finance												1			1		2
The European Journal of Finance					1												1
The Journal of Alternative Investments	1	2					1	2	1								7
The Journal of Finance	1							2	2	2		1	1			2	11
The Journal of Investing									1		1						2
The Journal of Risk Finance							1										1
The Journal of Wealth Management				1				1									2
Journal of Asset Management					1												1
Pensions						1											1
Journal of Emprical Finance				1													1
The Journal of Financial Research									1								1
SUM	**3**	**3**	**2**	**7**	**10**	**2**	**8**	**9**	**12**	**9**	**7**	**7**	**3**	**1**	**3**	**4**	**90**

2) Existing Literature on Fund Size and Fund Performance

Fund size refers to the hedge fund's asset under management (AUM), and while it is difficult to categorize Korean hedge funds based on fund size due to its short history, hedge funds are generally categorized by fund size as small (under $100 million), mid-size (between $100 million and $500 million), or large (over $500 million) (Pertrac Corp., 2012). There exist many studies on the causal relationship between hedge fund size and performance, however, despite somewhat inconsistent findings, overall the studies conclude that small hedge funds show better performance (Dimitrios et al., 2016, Pertrac Corp., 2012).

Do et al. (2005), Amenc and Martellini (2003) and Koh et al. (2003) reported a positive relationship between hedge fund size and performance, while Getmansky (2005) argued that there is an optimal fund size for best fund performance because hedge fund size and performance have a positive performance only in the beginning, after which the relationship turns into a concave as the fund size grows larger. On the other hand, Gregoriou and Rouah (2002) stated that there is no significant relationship between hedge fund size and performance, and Agarwal et al. (2004) argued against Koh et al. (2003)'s conclusion from Asian hedge funds that there is a positive relationship between hedge fund size and performance as well as an economy of scale effect.

While this inconsistency can be due to the different period, data, and methods of research, it more likely comes from looking at singular causal relationships rather than the overall feedback structure from a structural perspective (Kim et al., 1999). From a system dynamics perspective, it is possible to explain the feedback structure that causes the deterioration of fund performance as fund size grows by looking at the dynamic causal relationships among the diverse variables related to hedge fund size. Table 2 tabulates the findings from previous studies on hedge fund size and hedge fund performance.

〈Table 2〉 The Causal Relationship between Hedge Fund Size and Fund Performance

Reference	Hedge Funds Studied	Findings
Pertrac Corporation (2012)	BarclayHedge, Channel Capital Group, Cogent Investment Research, Eurekahedge, HFR, Lipper, MondoHedge and Morningstar, 1996-2011	Small funds outperform large funds
Joenvaara, J., Kosowski, R. and Tolonen, p. (2012)	BarclayHedge, EurekaHedge, HFR, Morningstar and TASS, 1994-2001	
Aymen K. and Iwan M. (2009)	Morningstar 1991-2005	
Nicole M. Boyson (2008)	Credit Suisse / TASS, 1994-2004	
Meredith, J. (2007)	HFR, HedgeFund. Net, Altvest and Barclays Global HedgeSource, 1996-2006	
Ammann, M. and Moerth, P. (2005)	TASS, 1994-2005	
Agarwal , V., Daniel, N. and Naik, N (2004)	HFR, TASS and ZCM/MAR, 1994-2000	
Harri, A. and Brorsen, B (2004)	LaPorte Asset Allocation 1977-1998	
Schneeweis, T., Kazemi, H. and Martin, G. (2002)	HFR, 1996-2000	
Viet Do, Robert Faff and J, Wickramanayake (2005)	HFR, 2001-2003	Large funds outperform small funds
Amenc, N. and Martellini, L. (2003)	CISDM, 1996-2002	
Koh, F. Koh, W. and Teo, M. (2003)	EurekaHedge and AsiaHedge, 1999-2003	
Getmansky, M. (2005)	TASS, 1994-2002	Concave relationship
Greg N. Gregoriou and Fabrice Rouah (2002)	Zurich Hedge fund and LaPorte, 1994-1999	No relationship

Source: Created by Author based on Dimitrios and Moshficque (2016) and Greg and Neal (2006)

3) Existing Literature on Fund Age and Fund Performance

Fund Age refers to, without considering backfill bias[2] the duration since the hedge fund's launch or first introduction in the database, or the length of time the hedge fund existed, and can be categorized as young (below 2 years), mid-age (between 2 to 4 years), or tenured

2) Backfill bias is phenomenon when a hedge fund is added to an index, the fund's past performance may be backfilled into the index.

(more than 4 years) (Pertrac Corp., 2012). Most research on fund age and fund performance found a negative causal relationship, that is, that young hedge funds have better performance than old funds. Table 3 lists the findings from existing literature on hedge fund age and performance.

〈Table 3〉 The Causal Relationship between Hedge Fund Age and Fund Performance

Reference	Hedge Funds Studied	Findings
Pertrac Corporation (2012)	BarclayHedge, Channel Capital Group, Cogent Investment Research, Eurekahedge, HFR, Lipper, MondoHedge and Morningstar, 1996-2011	Young funds outperform old funds
Frumkin, D. and Vandegrift, D. (2009)	Bloomberg, 2005-2007	
Aymen K. and Iwan M. (2009)	Morningstar 1991-2005	
Nicole M. Boyson (2008)	Credit Suisse / TASS, 1994-2004	
Meredith, J. (2007)	HFR, HedgeFund.net, Altvest and Barclays Global HedgeSource, 1996-2006	
Viet Do, Robert Faff and J, Wickramanayake (2005)	HFR, 2001-2003	
Amenc, N. and Martellini, L. (2003)	CISDM, 1996-2002	
Howell, M.J. (2001)	TASS/Tremont, 1994-2000	
Schneeweis, T., Kazemi, H. and Martin, G. (2002)	HFR, 1996-2000	Old funds outperform young funds

Source: Created by Author based on Dimitrios and Moshficque (2016) and Greg and Neal (2006)

Briefly said, previous studies report a clear negative relationship between hedge fund age and performance. However, whether it is appropriate to compare hedge funds that are established in different market conditions in analyzing the relationship between fund age and fund performance is questionable, as it may lead to inaccurate interpretations or incomprehensive reflections on actual performances of hedge funds. Therefore, this study will analyze the causal relationship between hedge fund age and performance further using a causal loop diagram based on system dynamics.

4) Existing Literature on Performance Fee and Fund Performance

Table 4 summarizes the findings from previous researches on the causal relationship between performance fee and hedge fund performance, which conclusively report a positive relationship. Since the interests of hedge fund managers and those of the investors match, this finding is instinctively understandable. Although Koh et al. (2003) and Schneeweis et al. (2002) argued there to be no significant relationship between performance fee and hedge fund performance, the majority of studies claimed a positive causal relationship between performance fee and hedge fund performance. Edwards and Caglayan (2001) found the causal relationship between performance fee and fund performance to be positive, while Amenc and Martellini (2003) conducted a two-sample t-test on high incentive funds and low incentive funds categorized as such based on whether their incentive fee ratio is higher or lower than 20% of return and found that the mean alpha for high incentive funds are higher than that of low incentive funds. More recently, Joenvaara et al. (2012) and Bae and Yi (2012) found a positive causal relationship between performance fee and hedge fund performance and Agarwal et al. (2009) revealed that not only higher incentive fees but also greater managerial discretion over lock-up period, notice period, and redemption period, etc., leads to better future performance.

〈Table 4〉 Causal Relationship between Performance Fee and Fund Performance

Reference	Hedge Funds Studied	Findings
Pavitra Kumar (2015)	TASS, 1996-2006	Higher fees, higher performance
Bae, K.H. and Yi, J. (2012)	TASS, 1994-2008	
Joenvaara, J., Kosowski, R. and Tolonen, p. (2012)	BarclayHedge, EurekaHedge, HFR, Morningstar and TASS, 1994-2001	
Agarwal V., N. D. Daniel, and N. Y. Naik (2009)	CISDM, HFR, MSCI and TASS, 1994-2002	
Viet Do, Robert Faff and J, Wickramanayake (2005)	HFR, 2001-2003	
Amenc, N. and Martellini, L. (2003)	CISDM, 1996-2002	
Franklin R. Edwards and Mustafa Onur Caglayan (2001)	MAR, 1990-1998	
Koh, F. Koh, W. and Teo, M. (2003)	EurekaHedge and AsiaHedge, 1999-2003	No Relationship
Schneeweis, T., Kazemi, H. and Martin, G. (2002)	HFR, 1996-2000	

Source: Created by Author based on Dimitrios and Moshficque (2016) and Greg and Neal (2006)

III. Causal Loop Diagrams on Hedge Fund Characteristics and Hedge Fund Performance

1. System Dynamics and Its Advantages

System dynamics is an analysis method that looks at the feedback structure among variables to induce their mutual causal relationships (Kim et al., 1999). As such, system dynamics highlights the causal relationships among variables and the dynamics of the feedback structure over time (Chung and Lee, 2012). However, system dynamics lacks a method for validity analysis on the causal relationship among its variables and thus requires demonstrative studies to support the casual relationships (Kim and Chung, 2015). As it is inefficient to demonstrate all relationships among the variables of the whole system, studies using system dynamics often utilize variables whose relationships have been identified in existing research to put into structure the causal relationships within the system (Chung and Lee, 2012: Eum et al., 2014: Kim and Chung, 2015).

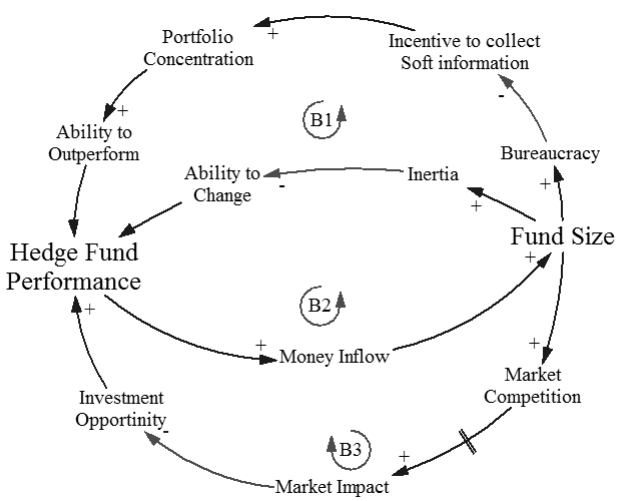
In this study, the causal relationships between hedge fund characteristics and hedge fund performance are investigated through dynamic analysis based on system dynamics. While most demonstrative researches look at singular causal relationships, system dynamics takes into account all nonlinear and mutually influential relationships in its feedback structure (Eum et al. 2014), therefore, it is useful in understanding the complex feedback structure among the variables of hedge fund characteristics and fund performance. Furthermore, this study aims to make suggestions for policies that can lever the variables forming negative loops for fund performance towards positive loops to assist the Korean hedge fund industry and financial authorities in the sustainable development of the Korean hedge fund market (Kim et al., 1999: Lee, 2015).

2. The Causal Loop Diagram between Fund Size and Fund Performance

The present study looks at the size effect of hedge funds on fund performance not only from a financial and economics perspective but also from the perspective of organizational theory, and in so doing, considers diverse factors such as the organizational structure and the decision-making process of hedge funds in analyzing the causal relationship between the variables.

〈Table 5〉 The Causal relationship between Fund Size and Fund Performance

Classification	Causal relationship	Reference	Loop
Negative feedback on performance due to bureaucracy and decrease in relationship commitment	Hedge Fund Performance → Money Inflow (+) → (Fund) Size (+)	James Xiong et al (2009)	B1
	(Fund) Size → Bureaucracy (+)	Stein (2002), Massa et al (2005)	B1
	Bureaucracy → Incentive to collect Soft Information (-)	Massa and Zhang (2009)	B1
	Incentive to collect Soft Information → Portfolio concentration (+)	Massa and Zhang (2009)	B1
	Portfolio concentration → Ability to outperform (+) → performance (+)	Massa and Zhang (2009)	B1
Negative feedback on performance due to reduction in ability to change	Fund size → Inertia (+)	Tushman and Romanelli (2008)	B2
	Inertia → Ability to change (-)	Sastry (1997)	B2
	Ability to change → Performance (+)	Mila Getmansky (2004)	B2
Negative feedback on performance due to increase in market risk	Fund size → Market Competition (+)	Mila Getmansky (2005, 2012)	B3
	Market Competition → Market Impact (+)	Mila Getmansky (2005, 2012)	B3
	Market Impact → Investment Opportunity (-) → Performance (+)	Mila Getmansky (2005, 2012)	B3



[Figure 2] Causal Loop Diagram between Fund Size and Fund performance

1) Negative Feedback on Performance due to Bureaucracy and Decrease in Relationship Commitment (Loop B1)

James Xiong et al. (2009) explained that past fund performance directly affects money inflow where money inflow is greater if hedge fund had shown good performance in the past. According to Massa et al. (2005), as fund size increases due to money inflow, the structural differentiation expands into a positive causal relationship, resulting in an increase in bureaucracy within the organization. The increase in bureaucratic control within the organization results in shirking from uncertainties, which in turn, leads to increase in inefficiency(Getmansky, 2004). Massa and Zhang (2009) found that hedge funds of flat organizations show better performance than those of hierarchical organizations and that fund managers have higher work commitment at flat organizations. More specifically, Massa and Zhang (2009) argued that the increase of one layer in the hierarchy of an organization leads to a monthly decrease of 24 bps and an annual decrease of almost 300 bps. The reason for such decrease is the obstacle that a hierarchical structure imposes on the creative decision-making of the fund managers and the utilization of soft information[3].

As a result, as fund size grows over time, bureaucracy within the organization naturally increases, which in turn reduces the incentive for fund managers to concentrate on managing the hedge fund to not only reduce their ability to take risks as well as their ability to outperform, ultimately decreasing overall fund performance.

2) Negative feedback on performance due to reduction in ability to change (Loop B2)

According to Sastry (1997), the inertia in an organization represents the strength of the relationship among the consumer, supplier, and financial sponsors. The level of inertia during the startup period of an organization is low, however, most organizations are able to establish a socially constant and structural inertia over time (Tushman and Romanelli, 2008), and as the size of the organization grows, the inertia also increases. However, with the increase in organization size, the ability to change decreases, and an inversely proportional relationship is

3) Stein (2002) defines soft information as information that cannot be known by anyone other than the direct producer of the information, and argued that smaller organizations are better in processing soft information since it is difficult to deliver soft information to upper levels to be used as reference for decision-making.

observed between inertia and the ability to change (Sastry, 1997). Therefore, the enlargement of the organization leads to increase in inertia, and this increase in inertia results in less ability to change. Identifying investment opportunities for hedge funds is a highly difficult task that requires extreme concentration and constant response to changing market situations, so the decrease in the ability to change can only result in the decrease in fund performance (Getmansky, 2004).

3) Negative Feedback on Performance due to Increase in Market Risk (Loop B3)

Getmansky (2005, 2012) utilizes the TASS database to study how hedge funds' flows, sizes, and competition affect their performances. Generally, investors tend to focus their investments on hedge fund category[4] that have high performance, and this trend is observed in Korea as well where most investments on hedge funds have been made in long/short funds since the introduction of hedge funds in Korea in 2011[5]. Getmansky uncovered that the concentration of investments in certain hedge fund categories leads to increased market competition, and the increase in competition deepens that among fund managers who strive for superior performance. The continued competition with in a hedge fund category impacts the market impact to limit investment opportunities and decrease fund performance.

Mozes and Orchard (2012), based on the data of 7,545 live and 8,916 dead funds between 1995 to 2010, argued that growth in fund size makes the fund riskier. Meanwhile, Getmansky (2004) argued that there is a positive relationship between hedge fund size and performance but that there is also an optimal point after which the relationship concaves. Therefore, from a system dynamics perspective, increase in market risk forms a negative feedback on performance.

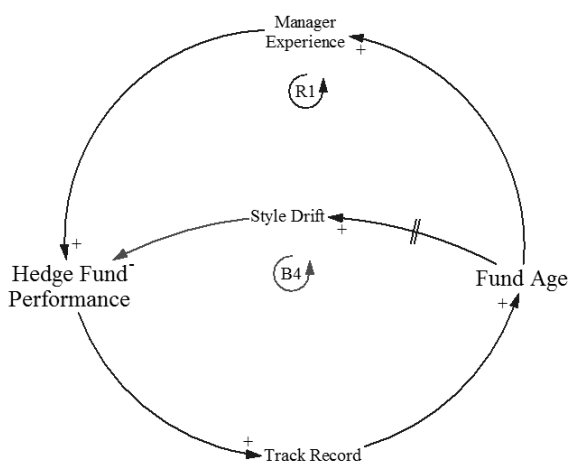
4) See appendix for the TASS Hedge Fund Category

5) Korean Hedge Funds Mostly Uses 'Long/Short Strategy'... the Reason? (2014.1.8, Yonhap Infomax)

3. The Causal Loop Diagram between Fund Age and Fund Performance

〈Table 6〉 The Causal Relationship between Fund Age and Fund Performance

Classification	Causal relation	Reference	Loop
Positive feedback on performance due to increase in manager experience	Fund age → Manager Experience (+)	Pertrac Corporation (2012)	R1
	Manager Experience → performance (+)	Park Young-Kyu, Joo Hyo-Keun (2014)	R1
Negative feedback on performance due to fund management style drift	Fund Age → Style drift (+)	Frumkin, D. and Vandegrift, D. (2009)	B4
	Style drift → performance (-)	Frumkin, D. and Vandegrift, D. (2009)	B4



[Figure 3] Causal Loop Diagram between Fund Age and Fund performance

1) Positive Feedback on Performance due to Increase in Manager Experience (Loop R1)

Even when considering the effect of survival bias[6], the increase in fund age increases the fund manager's experience (Pertrac Corporation, 2012). Studying the managers of Korean general equity funds from January 2007 to December 2011, Park and Joo (2014) looked at the relationship between the characteristics of fund managers, such as educational background,

6) Survival bias is the phenomenon where the profit rate of live funds is higher than that of dead funds.

and fund performance and demonstrated that, rather than educational background, longer experience in managing funds lead to better fund performance. Thus, longer fund age leads to great manager experience, and the increase in manager experience results in a positive feedback on fund performance.

2) Negative feedback on Performance due to Fund Management Style Drift (Loop B4)

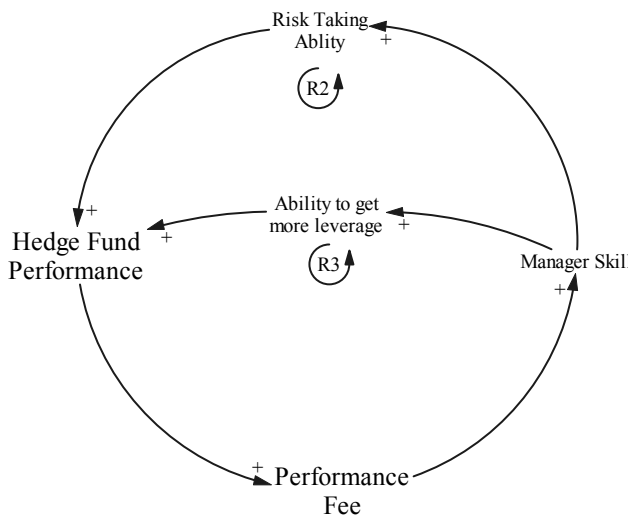
Unlike the positive feedback found in R1, Frumkin and Vandergrift (2009) argued that there is a negative relationship between hedge fund age and performance as the increase in fund age prompts fund managers to attempt style drifts in their management of the hedge fund, based on the results from their regression analysis on a random sampling of 50 U.S. hedge funds from the S&P500 data from May 2005 to July 2007. In addition, the same study also found that style drift results in decrease in fund performance.

As shown in Table 3, existing studies on the causal relationship between fund age and performance used singular and static analysis methods to find limited and consistent results such as young funds outperform or old funds outperform. However, through system dynamics thinking, the bird's eye view of the overall system on the diverse variables' mutual causal relationships illustrates that fund age gives positive feedback on fund performance up to a certain time, after which fund performance decreases at the occurrence of a style drift

4. The Causal Loop Diagram between Performance Fees and Fund Performance

〈Table 7〉 The Causal Relationship between Performance Fees and Fund Performance

Classification	Causal relation	Reference	Loop
Positive feedback on Performance due to improved risk-taking ability	Performance → Performance Fee (+)	-	R2
	Performance Fee → Manager Skill (+)	Pavitra Kumar (2015)	R2
	Manager Skill → Risk Taking Ability (+)	Zaheer (1992)	R2
	Risk Taking Ability → Performance (+)	Bodie, Kane and Marcus (1999)	R2
Positive feedback on performance due to the ability to get more leverage	Manager Skill → Ability to get more leverage (+)	Mila Getmansky (2004)	R3
	Ability to get more leverage → Performance (+)	Mila Getmansky (2004)	R3



[Figure 4] Causal Loop Diagram between Performance Fees and Fund performance

1) Positive Feedback on Performance due to Improved Risk-taking Ability (Loop R2)

The positive feedbacks in R2 and R3 explain how incentive is provided to hedge fund managers who achieved good performance to attract more highly professional and skilled talents, thus strengthening the hedge fund performance. In general, 20% of profit returns above the hurdle rate is collected by hedge fund managers as incentive fee. Therefore, hedge fund management firms strive to hire skilled fund managers and employees to improve their fund performances, and to hire high-quality employees, firms present high renumeration packages since people usually pursue greater compensation based on exchange theory (Simpson, 1972).

Finding inefficiencies in the market is not an ordinary task for fund managers and requires great expertise and talent (Getmansky, 2004). Srilata Zaheer (1992) found through a study on the risk behaviors of foreign exchange traders that risk-taking ability depends on manager skill where the two variables have a postivie causal relationship, which is ultimately causally connected to performance. As can be seen from the case of LTCM, risk-taking ability is not only affects hedge fund performance but can be the determining factor for the continuance of the hedge fund.

2) Positive Feedback on Performance due to the Ability to Get More Leverage (Loop R3)

Getmansky (2004) found that manager skill positively leads to the ability to get more leverage through a causal diagram study on fund size and hedge fund performance, and that if a hedge fund is able to get more leverage in the market, it will outperform its competitor and ultimately improve its performance.

Unlike the feedback structure between fund age and fund performance, the feedback structure between performance fee and fund performance only consists of positive feedback on performance as performance fee increases. It can easily be discerned that this is because both the interest of the fund manager and the investors are in improving the hedge fund's performance. However, in reality, performance fee cannot rise indefinitely due to market customs and competition and incentive fee is usually formed at around 20% of return (Carl Ackermann et al., 1999).

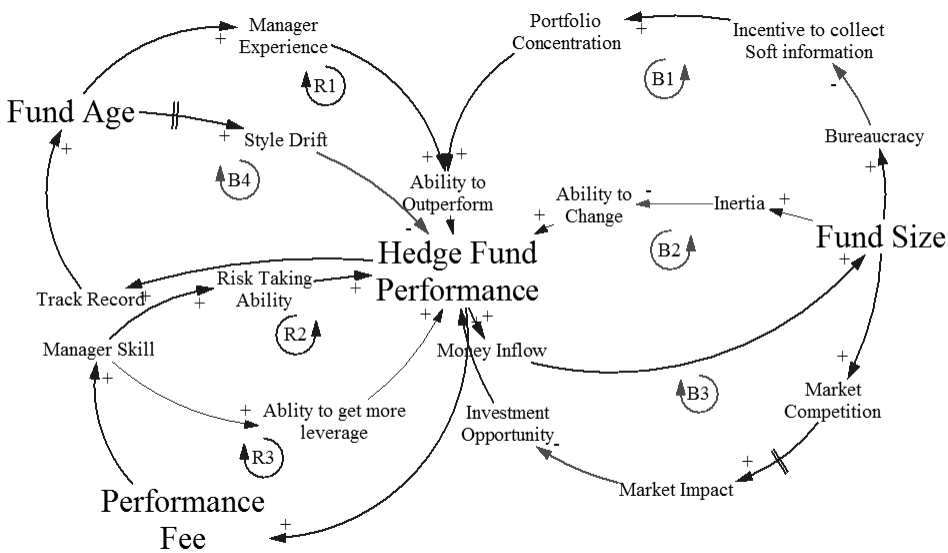
IV. The Integrated Causal Loop Diagram Between Hedge Fund Characteristics and Fund Performance

1. Integrated Causal Loop Diagram

The integrated causal loop diagram in Figure 5 shows the structural relationship of how hedge fund characteristics, such as fund size, fund age, and performance fee, affect fund performance and consists of performance strengthening loops R1, R2, R3 and performance limiting loops B1, B2, B3, B4 that occur over time.

First, B1, B2, and B3 presenting the causal relationship between fund size and fund performance show how increase in fund size dynamically affect fund performance. Up to a certain level, the growth in fund size due to money flow allows the hedge fund to achieve economy of scale (Koh et al., 2003), but further increase in size also increases AUM and the number of organization members, resulting in bureaucracy and, in turn, structural problems that hinder commitment to fund management and lower work commitment. Fund managers are also members of the organization who are affected by the lowered work commitment and

so their concentration on managing their hedge funds also become affected. Ultimately, a dynamic causal relationship is observed which decreases fund performance. In this way, a bird's eye view of the whole system enables further understanding on why existing studies that used singular statistical methods found that either small or large funds outperform others or that fund size and fund performance have no significant relationship. Furthermore, the causal loop diagram illustrates the market flow process where the increase of fund size intensifies competition among hedge funds and naturally also market competition, and increased competition lowers management opportunities for higher return to create a negative feedback structure that limits fund performance.



[Figure 5] Integrated CLD between Hedge Funds characteristics and Fund performance

The causal relationship between fund age and fund performance can be found in R1 and B4. With the aging of the fund, in the early stage, the fund manager's experience increases to improve management ability and fund performance. However, as the fund ages further, a style drift occurs to form a performance limiting loop that decreases the hedge fund's performance. These loops also enable comprehensive interpretation of the inconsistent findings of previous studies within the overall system structure.

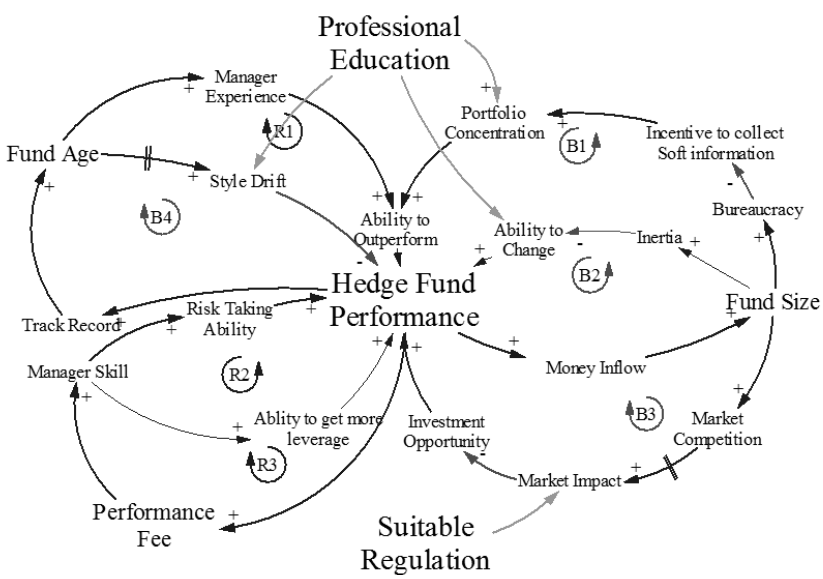
Lastly, in the causal relationship between performance fees and fund performance, due to

the characteristics of hedge funds mentioned in Section 2, better fund performance leads to larger performance fees to provide more chances to attract highly skilled talents. Talented managers possess fund management experience and skills and, based on their expertise, are able to improve hedge fund performance by making good decisions on the fund's market periods. Thus, a performance strengthening causal loop is formed.

As illustrated so far, the integrated causal loop diagram among fund size, fund age, performance fees and fund performance allows understanding of the overall feedback structure of the system as well as the inconsistent findings of previous researches. The application of the integrated causal loop diagram is meaningful in that it provides a comprehensive understanding, and especially in terms of the Korean hedge fund market, points to the need for appropriate policies for the market's sustainable growth and development.

2. Policy Suggestions for a Sustainable Growth Strategy of the Hedge Fund Market

Based on the findings on the causal relationships between hedge fund characteristics and fund performance, it is possible to make some policy suggestions that will lead the system in a positive direction. Small efforts in terms of policies can let variables or relationships between



[Figure 6] Policy suggestions for a sustainable growth strategy for the Korean hedge fund market

variables to bring more dynamic to the whole system (Kim et al., 1999). As can be seen in the integrated causal loop diagram, when the size of the hedge fund grows beyond a certain point, market risk increases to necessitate appropriate policy responses. In this aspect, the present study presents important implications as it identifies the overall structural feedback in the hedge fund market by considering the diverse causal relationships among the variables of hedge fund characteristics and fund performance as well as market risks that occur from those relationships, which was neglected in previous literature. The following are policy suggestions for the performance limiting loops B1, B2, B3, and B4 that reduce hedge fund performance over time as fund size & age increase.

1) Implementation of Suitable Regulations

The United States government has been implementing regulations on hedge funds for their efficient management. Among these regulations, an article was added to protect hedge fund investors from fraudulent activities in September 2003, which made it a requirement for hedge fund advisors to register at the Securites and Exchange Commission (SEC) and for hedge fund investors to be accredited only if they have assets exceeding US$1.5 million. Hedge funds that fail to fulfill these requirements are unable to collect performance fees, and if the hedge fund exceeds US $25 million in size or if its lock-up period exceeds 2 years, the hedge fund is required to be registered at the SEC as well (Frumkin and Vandergrift, 2008). Through their analysis of the performance of hedge funds that outperform S&P 500 based on the fixed-effects panel data from May 2005 to July 2007, Frumkin and Vandergrift (2008) found that these registration requirements for hedge funds led to increase in fund performance.

Hedge funds, due to their inherent characteristics, drive efforts to find investment opportunities arising from market inefficiencies and utilizes excessive leverage. Thus, after an optimal point, growth in fund size leads to greater market risk and market impact. To look at a real-life case, LTCM established in 1994 hired fund managers with graduate degrees from MIT and Harvard and was hugely successful with more than US$125 billion in total assets, but went bankrupt in 1998 due to the Russian government's moratorium. LTCM's failure is attributed largely to its excessive concentration in specific market directions and positions. In 1998, LTCM constructed its position based on expectations that bond spread will be narrowed but the market moved in the opposite direction. LTCM had invested almost US$1,250 billion

on derivatives, and the bankruptcy of LTCM rapidly froze the hedge fund market (Franklin Edwards, 1999). As can be seen from the case of LTCM, in order for Korean hedge funds to grow sustainably, the financial authorities must appropriately monitor and regulate hedge funds to prevent extreme increase of market risks and to allow the hedge fund market to develop in a positive direction. Suitable regulations should be implemented to promote these goals. Meanwhile, Korea's hedge fund market is still in its early stages and needs to expand its pool of market participants, therefore, continuous review for improving its system to promote growth should be conducted rather than implementation of limiting regulations and restrictions.

2) Provision of Professional Education

The causal relationships between hedge fund characteristics and fund performance (Figure 5) show how positive and negative feedbacks on fund performance interact. For continual improvement in hedge fund performance, professional education for all participants of hedge funds will be highly beneficial. Participants of hedge funds refer to fund mangers who are in charge of hedge funds, hedge fund investors, and regulatory institutions such as the Financial Supervisory Service that are responsible for establishing the laws and regulations on hedge funds and a stable system for the hedge fund market.

For fund managers, professional knowledge on constructing management strategies for continuous performance, risk reduction strategies, and methods for gaining investment opportunities efficiently can be provided, so that the managers can attain the expertise necessary for constructing new management strategies. For hedge fund investors, since in Korea the majority of them are individual investors, education for institutional investors such as mutual-aid association pensions will increase interest in Korean hedge funds to help build a foundation on which Korean hedge funds can develop further. Professional education on market support mechanisms such as hedge fund regulations and best practices in market risk management can be provided to officials at the Financial Supervisor Service so that policies for the sustainable growth of Korean hedge funds can be implemented. The Alternative Investment MBA for cultivating hedge fund experts at a Seoul School of Integrated Sciences & Technologies (aSSIST) in collaboration with Anda Asset Management is a good example of how professional education can be provided[7].

V. Conclusion and Limitations

1. Summary of Results and Their Implications

Lively and active research is necessary for the development of the still-young Korean hedge fund market, however, few studies are currently being conducted. To mend this gap, this study aimed to examine the mechanism behind how hedge fund characteristics and their variables affect hedge fund performance and explored their causal relationships. While existing studies have pursued singular and static investigations which prevented identification of the dynamics between the variables and fund performance, the present study comprehensively synthesized the findings from previous research and selected fund size, fund age, and performance fee to investigate the causal relationships among multiple factors. Through this investigation, it was possible to understand the various feedback structures among variables that affect the performance of hedge funds. representative Fund size, fund age, and performance fees are the most representative characteristics of hedge funds, and by studying their feedback structure on fund performance, this research was able to uncover the temporal dynamics and positive/negative feedback loops in their causal relationships and to suggest policies for further growth and development of the Korean hedge fund market. The implications of this study can be summarized as follows.

1) Implications from an Academic Perspective

From an academic perspective, this study contributes to existing literature as the first exploratory research in Korea to investigate the relationship between the characteristics of hedge funds and fund performance based on a comprehensive literature review on papers published since 2000 found and sorted using Google Scholar. Unfortunately, the history of Korean hedge funds is too short so it was difficult to find research done by Korean scholars on the causal relationship between hedge fund characteristics and fund performance. The literature review presented in this paper will be useful resource Korean scholars in their studies on this topic in the future.

Secondly, although recent studies have been introducing the systems thinking methodology

7) Anda Asset Management & a Seoul School of Integrated Sciences & Technologies (aSSIST) Cultivates Hedge Fund Experts (2015.12.16, The Korean Economic Daily)

and presenting causal loop diagrams based on the findings from existing literature on the causal relationships among variables (Chung and Lee, 2012; Eum et al., 2014), this study is notable as the first attempt to apply this methodology to look the feedback structure in the overall system of the dynamic causal relationships among multiple variables of hedge fund characteristics and fund performance.

2) Implications from an Industry Perspective

From the industry perspective, the causal loop diagram on fund size and fund performance presented in this study assists in providing deeper understanding on their dynamic causal relationship which was so far unavailable from past studies due to their singular analyses. Most of the studies published since 2000 on the relationship between hedge fund size and performance concluded that small funds outperform large funds, while a few argue that there is no significant relationship. The inconsistency in the findings is not only due to the differences in the subjects and periods used for analysis, but also due to the studies' static methodology. By utilizing causal loop diagrams from a systems thinking perspective, this study was able to identify a system structure where fund performance was suppressed as fund size increased due to the dynamic feedback of multiple variables.

Second, this research investigated the dynamic causal relationship between fund age and fund performance. In the early stages, fund performance is strengthened as fund managers gain more experience, but over time, style drifts are made, resulting in a feedback that decreases fund performance. This finding was also uncovered by examining the various routes through which dynamic feedback from diverse variables affect fund performance unlike the singular approaches used in previous studies.

Third, the exploration into the causal relationship between performance fees and fund performance showed a performance strengthening feedback structure where better fund performance resulted in higher performance fees, which in turn attracts highly skilled talents to the fund's management to further increase fund performance, corroborating the findings of previous studies.

Lastly, the policy suggestions made in this paper in terms of regulations and education for the continued sustainable growth of Korean hedge funds present useful guidelines for the industry, and it is hoped that the suggestions will contribute to the development of the

Korean hedge fund market as well as to future research.

2. Limitations and Suggestions for Future Studies

This study presented causal loop diagrams showing the relationships between hedge fund characteristics and fund performance using system dynamics. The characteristics of hedge funds whose dynamic feedback structures were examined were fund size, fund age, and performance fees. However, hedge funds have additional characteristics over than the three analyzed in this study, such as managers' characteristics and discretion characteristics including notice period, restrictions on redemption, etc. Future studies will benefit from exploring these other characteristics and their variables. In this aspect, this study leaves it up to future research to demonstrate additional integrated system dynamics models, especially for the Korean hedge fund market, based on the causal relationships identified in this paper.

Another limitation of this study that it does not study how the performance persistence of hedge funds is affected by variables that affect fund performance, and this area requires further research as well. The application of a stock-flow diagram to see the strength and speed of the causal relationships examined in this study will also be helpful in further understanding the integrated system of hedge fund characteristics and fund performance.

Based on the limitations of this research, future research will be conducted to demonstratively analyze the degree of causal relationships between hedge fund characteristics and hedge fund performance that affect performance persistence using actual hedge fund data. Korean hedge funds have great potential for growth, and it is hoped that the findings and suggestions made in this study will be the beginning of many researches to present useful guidelines and alternative methods of analysis for hedge fund managers, investors, and officials of financial regulatory institutions for the sustainable development of the Korean hedge fund market.

【REFERENCES】

Chung Chang-kwon, Lee Dong-hyun. (2012). “Exploratory Study on Causality of Expansion Strategy into Emerging Market: Systems Thinking Approach,” Korea System Dynamics Review, Vol. 13, No.3, pp.67-98.

Eom Jae-gun, Chung Chang-kwon, Sul Won-sik. (2014a). “Exploratory Study on Causality of Foreign Exchange Exposure and Hedge Strategy: Systems Thinking Approach,” Korea System Dynamics Review, Vol. 15, No.2, pp. 97-131.

Eom Jae-gun, Chung Chang-kwon. (2014b). “A System Dynamics Simulation on KIKO Derivatives and its Implications from International Trade” Korea System Dynamics Review, Vol. 15, No.4, pp. 5-28.

Lee Jeong-Ha. (2015). “A Structural Analysis between Financial Regulations and Security Industry through the Systems Thinking” Korea System Dynamics Review, Vol. 16, No.4, pp.31-50.

Park Young-Kyu, Joo Hyo-Keun. (2014). “Which Manager Characteristics Determine the Fund Manager Performance?: A Study on the Relationship between the Performance and Manager Characteristics”, Korean Journal of Financial Studies, Vol. 43, No. 4, pp 679-703

Kim Do-hun, Moon Tae-hun, Kim Dong-hwan. (1999). System Dynamics, Daeyoung Munwhasa

Kim Dong-Seok, Chung Chang-Kwon. (2016). “Exploratory Study of Causal Relationship between Social Capital and Performance on Strategic Networks: Systems Thinking Analysis” Korea System Dynamics Review, Vol. 17, No.1, pp. 41-64.

Yi June-Suh. (2016). “Evaluation Model and Performance Analysis for the Korean-Style Hedge Funds”, Korean Journal of Financial Studies, Vol. 15, No.1, pp.1-34.

Agarwal, V., Daniel, N., and Naik, N. (2009). “Role of managerial incentives and discretion in hedge fund performance”, Journal of Finance 64, pp. 2221-2256

Agarwal, V., Daniel, N., and Naik, N. (2004). “Flows, Performance and Managerial Incentives in Hedge Funds”, LBS and Georgia State University

Amenc, N. and Martellini, L. (2003). “The Alpha and Omega of Hedge Fund Performance Measurement”, Risk and Asset Management Research Center, February, 27th, 2003.

Ammann, M. and Moerth, P. (2005). “Impact of Fund Size on Hedge Fund Performance”, Journal of Asset Management, 6(3), pp. 219-238

Aymen, K. and Iwan, M. (2009). “Performance and Characteristics of Mutual Fund Starts”,

European Journal of Finance, September

Bae, K.H., Yi, J. (2012). "Performance Persistence and Flow Restrictions in Hedge Funds", [Online]. Available at http://asianfa2012.mcu.edu.tw/fullpaper/10331.pdf

Bodie, Zvi, Kane, Alex, and Marcus, Alan. (1999). Investments 4th edition, Irwin/McGraw-Hill, MA

Carl Ackermann, Richard McEnally, and David Ravenscraft. (1999). "The Performance of Hedge Funds: Risk, Return, and Incentives", The Journal of Finance, Vol. 54, No. 3, pp. 833-874

Dimitrios, S. Keith, A. and Moshfique, U. (2016) "Recent advances in hedge funds' performance attribution: Performance persistence and fundamental factors", International Review of Financial Analysis, Vol. 43, January 2016, pp. 48-61

Dvir Frumkin, Donald Vandegrift. (2008). "The Effect of size, age, beta and disclosure requirements on hedge fund performance", Journal of Derivative & Hedge Funds, Vol. 15, No. 3, pp. 214-251

Francois Serge Lhabitant. (2011). Handbook of Hedge Funds, John Wiley & Sons, New York

Franklin R. Edwards and Mustafa Onur Caglayan. (2001). "Hedge Fund Performance and Manager Skill", Journal of Futures Markets, Vol. 21, No. 11, pp. 1003-1028

Frumkin, D. and Vandergrift, D. (2009). "The effect of size, age, Beta and Disclosure Requirements on Hedge Fund performance", Journal of Derivatives and Hedge Funds, 15(3), pp. 241-251

Fung, W. and Hsieh, D. A. (1997). "Survivorship bias and investment style in the return of CTAs: The information content of performance track records" Journal of Portfolio Management, Vol. 24, No. 1, pp. 30-41

Greg N. Gregoriou and Fabrice Rouah. (2002). "Large versus Small Hedge Funds Does Size Affect Performance?", The Journal of Alternative Investments, Vol. 5, No. 3, pp.75-77

Greg N. Gregoriou and Neal E. Duffy, (2006). "Hedge Funds: A summary of the literature", Pensions, Vol. 12, No 1, pp. 24-32

Gregoriou, G. N. and Rouah, F. (2002). "Large versus Small Hedge Funds: Does Size Affect Performance?", The Journal of Alternative Investments, 5(3), pp. 75-77

Haim, A. Mozes, and Jason Orchard. (2012). "The Relation between Hedge Fund size and Risk", Journal of Derivatives and Hedge Funds, Vol.18, pp. 85-109

Harri, A. and Brorsen, B. (2004). "Performance persistence and the source of returns for hedge funds", Applied Financial Economics, 14(2), pp.131-141

Howell, M.J. (2001). “Fund Age and Performance”, The Journal of Alternative Investments, 4(2), pp.57-60.

James Xiong, Thomas Idzorek, Peng Chen and Roger Ibbotson. (2009). “Impact of Size and Flows on Performance for Fund of Hedge Funds”, The Journal of Portfolio Management, Winter, pp. 118-130.

Jeremy C. Stein. (2002). “Information Production and Capital Allocation: Decentralized versus Hierarchical Firms”, The Journal of Finance, 2002, Vol. 57(5), pp.1891-921.

Joenvaara, J., Kosowski, R. and Tolonen, P. (2012). “New ‘'Stylized facts'' about Hedge Funds and Database Selection Bias”, the CREST Paris 4th Annual Hedge Fund conference 2012

Koh, F., Koh, W. and Teo, M. (2003). “Asian Hedge Funds: Return Persistence, Style and Fund Characteristics”, [Online]. Available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=416960 [Accessed 05 October 2015].

Massa, Massimo and Lei Zhang. (2009). “The Effects of Organizational Structure on Asset Management”, Working paper, INSEAD

Massa M., J. Reuter and E. Zitzewitz. (2005). “The Rise of Anonymous Teams in Asset Management”, Working paper

Meredith, J. (2007). “Examination of Fund Age and Size and its Impact on the Hedge Fund Performance” Derivative Use, Trading & Regulation, 12(4), pp.342-350

Meredith, J. (2009). “Update to 'an Examination of Fund Age and Size and its Impact on the Hedge Fund Performance'”, The Journal of Investing, Spring 2009, pp.108-114

Mila Getmansky. (2004). “Process of Growth of a Hedge Fund: Impact of Size on Performance”, MIT Sloan School Management, working paper

Mila Getmansky. (2005). “The Life Cycle of Hedge Funds: Fund Flows, Size and Performance”, MIT Sloan School of Management, working paper

Mila Getmansky. (2012). “The Life Cycle of Hedge Funds: Fund Flows, Size, Competition, and Performance”, Quarterly Journal of Finance, Vol 2, No. 1, pp. 1-53

Nicholas Chan, Mila Getmansky, Shane M. Haas, and Andrew W. Lo. (2006). “Do Hege Funds Increase System Risk?”, Economic Review Fourth Quarter 2006, pp.49-80

Nicole M. Boyson. (2008). “Hedge Fund Performance Persistence: A New Approach”, Financial Analysts Journal, Vol. 64, No 6, pp. 27-44

Pavitra Kumar. (2015). “Hedge Fund Characteristics and Performance Persistence: Evidence from 1996-2006”, Journal of Finance, Vol. 5, No. 2, pp.1550018, 1-43

Petrac Corporation. (2012). "Impact of Size and Age on Hedge Fund Performance: 1996-2011", 6th Annual Update

Robert, C. Jones, CFA, and Russ Wermers. (2011). "Active Management in Mostly Efficient Markets" Financial Analysts Journal, Vol. 67, No 6, pp. 29-45

Russ Wermers. (2010). "Matter of Style: The Causes and Consequences of Style Drift in Institutional Portfolios", SSRN Electronic Journal, April 2010.

Sastry, M. Anjali. (1997). "Problems and Paradoxes in a model of Punctuated Organizational Change", Administrative Science Quarterly, Vol. 42, pp. 237-275

Schneeweis, T., Kazemi, H. and Martin, G. (2002). "Understanding Hedge Fund Performance: Research Issues Revisited – Part I", The Journal of Alternative Investments, 5(3), pp.6-22.

Scott, W. R. (1975). "Organizational Structure", Annual Review of Sociology, vol.1, pp.1-20

Simpson, R. L. (1972). "Theories of Social Exchange" In J. Thibaut, J. Spence & R. Carson, "Contemporary Topics in Social Psychology", Morristown, NJ: General Learning Press, pp. 79-97

Stein, J. C. (2002). "Information Production and Capital Allocation: Decentralized versus Hierarchical Firms", Journal of Finance, 57, 1891-1921

Walter, Gehin. (2007). "The Challenge of Hedge Fund Performance Measurement: a Toolbox Rather Than a Pandora's Box", EDHEC Business School, Risk and Asset Management Research Centre

Viet Do, Robert Faff and J, Wickramanayake. (2005). "An Empirical Analysis of hedge fund performance: The case of Australian hedge funds industry", Journal of Multinational Financial Management, pp.377～393

Zaheer, Srilata A. (1992). "Organizational Context and Risk-Taking in a Global Environment: A Study of Foreign-Exchange Trading Rooms in the U.S. and Japan", MIT Sloan School of Management PhD thesis.

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[APPENDIX : TASS Hedge Fund Category]

Category	Definition	Type of Strategy
Convertible arbitrage	A strategy of arbitraging the relative mis-pricing of related convertible securities (usually from the same issuer) in order to obtain low volatility returns.	Non-directional
Long/short equity hedge	A strategy of investing in equity or equity-like instruments where net exposure (long minus short) is low.	Non-directional
Event driven	A strategy that exploits mispricings arising in special situations or events such as mergers, restructurings, takeovers, and so on.	Non-directional
Fund of funds	Capital is allocated to a variety of hedge funds and pooled investment vehicles which investors might not have access to otherwise	Cannot be classified
Multi-strategy	Allocation of capital to a mixture of strategies simultaneously to realize short and long-term gains, and to capitalize on current investment opportunities.	Cannot be classified
Global macro	A strategy which uses leverage and derivatives to exploit macroeconomic changes in global economies which affect securities, commodities, interest rates, exchange rates, and so on	Directional
Emerging markets	A strategy that focuses on investing in volatile emerging markets, capitalizing on economic changes.	Directional
Managed futures	An arbitrage strategy that exploits relative mispricings between futures contracts and replicating portfolios of underlying securities.	Non-directional
Fixed income arbitrage	A strategy of holding long and short bond positions in cash and derivatives markets in order to exploit pricing discrepancies between related securities	Non-directional
Equity market neutral	A strategy that employs both long and short positions in equity portfolios in order to hedge out market risk.	Non-directional
Dedicated short bias	A strategy similar to long/short equity hedge, except with signi¯cant net short exposure.	Directional