



**UNIVERSITY OF GOTHENBURG**  
**SCHOOL OF BUSINESS, ECONOMICS AND LAW**

Master Degree Project in Finance

## **Star Wars:**

The effect on fund flow due to a change in Morningstar's star rating

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Supervisor: Dawei Fang  
Master Degree Project No. 2016:126  
Graduate School



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**Abstract:** This paper examines whether a change in Morningstar's star rating has any effect on fund flows within the Swedish mutual fund market. Using an event-study approach on over 2000 Morningstar star rating changes over the period November 2009 to December 2015, we do not document statistically significant abnormal flow following a star rating change. This is in contrast to previous research within the US-market.

*Keywords:* Fund Flow, Morningstar, Mutual Fund, Rating Change

## **Acknowledgement**

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# 1. Introduction

The primary objective of this paper is to examine whether a change in Morningstar's star rating has any effect on the fund flow in the Swedish mutual fund market. This is accomplished by examining the existence of a possible abnormal flow due to a rating change. Numerous papers confirm that there exists a positive relationship between historical performance and fund flow (see e.g., Del Guercio and Tkac, 2008; Sirri and Tufano 1998). However, few studies have been conducted outside the US market. Although Del Guercio and Tkac (2008) found a statistical significance for changes in Morningstar's rating on fund flow in the US market, Jun *et al.* (2014) could not validate the latter on the Chinese market. However, Sweden as a developed country should have more in common with USA than China according to the research of Ferriera *et al.* (2012).

Morningstar is the world's most recognized mutual fund rating company. In Sweden, Morningstar with its five-star rating system is a common tool for decision-making for selecting funds. Large banks in Sweden such as Swedbank (2016) use the Morningstar rating system to evaluate their mutual funds to make the decision-making easier for casual investors<sup>1</sup>. Since the rating is based on the risk-adjusted historical performance, it is an adequate measurement to examine the relationship between historical performance and fund flow. Further, according to Del Guercio and Tkac (2008), Morningstar's star rating affects casual investors' decision-making. Hence, the star rating affects the capital inflow and outflow of a mutual fund.

It is important to examine the performance and fund flow relationship, since mutual fund managers receive a percentage fee of the fund's total assets. Chevalier and Ellison (1997) show that a positive and convex flow-performance relation can induce, via asset-based compensation, underperforming managers to take high risks. Hence, investigating the flow-performance relation helps

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<sup>1</sup> Casual investors is an expression for non-professional investors

<sup>2</sup> Del Guercio and Tkac (2008) argue that the quantitative results are very similar when they vary the length of an estimation period of 12 to 36 months.

identify managers' risk-taking incentives. Considering this, a positive relationship between the Morningstar rating and fund flow might induce fund managers to take on more risk, since a higher star rating would yield higher earnings.

Previous research has shown a significant abnormal flow within the US market (Del Guercio and Tkac 2008). Hence, by following the same approach as Del Guercio and Tkac (2008) we examine the Swedish mutual fund market. Since we want to exclude the effects of the financial crises and we want the most recent data we evaluate the time period of November 2009 to December 2015. During this period we experience more than 5000 star rating changes for 1710 Swedish funds. The star rating changes are examined by conducting an event-study. To estimate the predicted flow we use a benchmark regression. Further, abnormal flow due to a star rating change equals the actual flow minus the predicted flow. The event-study approach isolates the effect of a star rating change and is not affected by historical performance. To test abnormal flow for significance we conduct two different t-tests, the standardized cross-sectional test and the ordinary cross-sectional test. Overall, the tests indicate no significant abnormal flow. However, the standardized cross-sectional test indicates a significant negative abnormal flow following a downgrade from two to one star. Hence, our results indicate that the effect on fund flow due to a change in star rating is absent within the Swedish market.

The outline of this paper is as follows. Section 2 reviews the previous literature regarding the relationship between historical performance and fund flow. Section 3 describes the data preparation and the final dataset. Section 4 outlines the methodology. Section 5 presents our results. Finally, section 6 concludes.

## 2. Literature review

Researchers have tried to shed light on fund investor behaviour to explain fund flows. Many papers document a strong relationship between past performance and fund flow. For example, Sirri and Tufano (1998) study how consumers make their investment decisions by observing flows into and out of equity mutual funds. They demonstrate a strong relationship between past performance and fund flow, which suggests that consumers chase returns and choose the funds with the highest recent returns. However, they also argue that investors fail to leave poor performers. Further, search cost is also explained to be an important determinant of fund flow (Huang *et al*, 2007).

Huang *et al*. (2007) elaborate on the intuition of Sirri and Tufano (1998) that search costs could affect the sensitivity of fund flows to past performance. They examine how search costs affect investors' allocation decision among funds. By including the search costs in a model where past performance determines flow, they illustrate that mutual funds with lower search costs have higher sensitivity to performance than higher cost peers.

Since previous research mainly have focused on the US fund market but not the non-US markets, Ferreira *et al*. (2012) aim to fill this void by evaluating the fund flow-performance relationship around the world. They continue the discussion of Huang *et al*. (2007) that search costs affect the sensitivity of performance. Ferreira *et al*. (2012) use these conceptualized findings on the country level and compare countries with different levels of search costs. They find that mutual fund investors sell losers more and buy winners less in more developed countries. Their conclusion is that investors in more developed countries are more sophisticated and face lower search costs in the mutual fund industry.

Further, Del Guercio and Tkac (2008) evaluate whether past performance and low search costs determine fund flows. Specifically, they evaluate whether changes in Morningstar's star rating affect fund flow. Morningstar's star rating is of interest since casual investors can find unbiased ratings at a low cost. In their

research they apply an event-study approach to evaluate if they could find an abnormal fund flow following a star rating change. They find significant abnormal fund flows following both an upgrade and a downgrade. Their research reveals that an upgrade results in an inflow and a downgrade results in an outflow of capital. However, although they find, in most cases, a negative response to rating downgrades, they find no response to a downgrade from five to four. They argue that this might be due to fund companies' promotion that four stars still are of high quality.

Further, Jun *et al.* (2014) re-examine the mutual fund flow-performance relation due to star rating changes by examining mutual funds in China. They find that funds that have performed well in the past do not attract new additional flow after controlling for performance. Further, funds with a five-star Morningstar rating do not have a significant effect on fund flows.

Most of the research confirms that there exists a positive relationship between fund flow and past performance. However, few studies have been conducted outside the US market. Morningstar's star rating has been proven to have a significant effect on fund flow within the US market (Del Guercio and Tkac, 2008). However, Jun *et al.* (2014) could not find support of this on the Chinese market. Further, there is no evidence of an existence or non-existence of this effect on the Swedish market. Therefore, it is of interest to examine whether there is a relationship between Morningstar's star rating changes and fund flow on the Swedish mutual fund market.

## **3. Data**

### **A. Morningstar's star rating**

The Morningstar star rating was first established in 1985 (Morningstar, 2008). Originally, this service was only available to paying customers. Nowadays, these ratings are available freely to everyone. Morningstar has grown to become the world's most recognized mutual fund rating company. Their star rating system is available globally through their website. Further, in Sweden it is a common tool for decision-making for selecting funds. Large banks in Sweden such as Swedbank (2016) use the Morningstar rating system to evaluate their mutual funds to make the decision-making easier for casual investors.

The star rating evaluates the historical performance with respect to its adjusted return and risk using a rolling average (Del Guercio and Tkac 2008).

Morningstar's risk adjusted rating is determined by subtracting the relative risk from its relative return (Sharpe, 1998). Every fund is divided into different categories. The relative risk and return is determined by comparing the risk and return for each fund with its peer group

Further, the funds are ranked and rated within the fund's Morningstar category, where Morningstar assigns the top 10 % with five stars (category rating of five), the next 22,5 % are assigned four stars, the next 35 % assigned three stars, the next 22,5 % are assigned two stars and the bottom 10 % are assigned one star (Sharpe, 1998). Further, Morningstar uses four different rating systems, three-year, five-year, ten-year and overall rating. They first rate a mutual fund three years after its inception. Notably is that the rating system has been reviewed and changed since its inception. Specifically, it experienced a significant change in its treatment of risk in 2002 (Morningstar, 2008).

### **B. Description of our sample**

To investigate the impact of Morningstar's rating on fund flows, we have obtained monthly data on all Swedish open-end funds from November 2009 to



December 2015 from Morningstar's database, Morningstar Direct. The data obtained from Morningstar Direct includes historical data on Morningstar overall ratings, returns and net assets. Further, we have collected historical data on the 3-month Treasury bill and the OMX SPI index from the Bloomberg database. Since survivorship bias is a large concern due to the high rate of liquidations in the fund market, we have chosen to include all dead funds if they are old enough to have a star rating within our time period. Our sample consists of eight different star rating change events, where the rating increases or decreases with one star, for example from one to two stars, from four to five stars etc. In accordance with Del Guercio and Tkac (2008), we do not examine changes larger than one star. The collected data consists of 1710 Swedish mutual funds, 5395 star rating change events and 53 928 fund-months, prior to our data cleaning.

### **C. Data cleaning**

To be able to obtain accurate calculations we need data on a monthly basis for all variables. However, many of the funds present information about their fund on a quarterly basis. These funds have been removed from the dataset, since they would not give us accurate calculations. However, funds with a few missing observations are kept in the dataset. If they have missing observations during either the estimation period or the event period, the event has been removed from the dataset. However, we manually fill in missing observation for star ratings using the latest observation.

The fund market is characterized by numerous mergers. A merger causes an increase in net assets of a fund that is not performance driven. To eliminate this problem we have obtained information from Morningstar Direct regarding each merger within the Swedish open-end fund market during our time-period. From Morningstar Direct we obtained information of 190 mergers. This information is used to remove all fund-months following the mergers.

Another concern is that we experience overlapping events within the estimation period. We argue that the following events are affected by the first. Therefore, we

delete the latter events if the same type of star change event occurs multiple times within the same estimation period.

Further, we delete all star changing events that are greater than one star, which represent 125 events or approximately 2 % of all events. In accordance with Del Guercio and Tkac (2008) and Ferreira *et al.* (2012) we winsorize the top and bottom 1 % in total net assets to avoid that extreme observations drive the results.

Our final dataset consists of 550 Swedish funds, 2170 events, 1044 upgrades and 1126 downgrades. Table 1 provides summary statistics on the frequency of star rating changes.

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**Table 1**  
**Frequency of Changes in Morningstar Star Rating**

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The table illustrates the number of Morningstar star rating changes over the period January 2011 – June 2015. The table consists of eight categories, divided into four upgrades and four downgrades.

Morningstar star rating after change	One-star upgrade	One-star downgrade
1	N/A	137
2	120	317
3	299	445
4	418	227
5	207	N/A
Subtotal	1044	1126
Total star rating changes	2170	

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## **D. Timing and Measurement of Fund Flows**

Flow is defined as the net growth rate of new inflow into the fund. Here the assumption is that all the capital gains are reinvested and therefore the flow reflects only the growth rate due to new money invested in the fund and not due to capital gains earned on the assets under management. Following Chevalier and Elisson (1997), Sirri and Tufano (1998) and Ferreira *et al.* (2012) we define

flow of new money into the fund as the growth rate of total net assets under management of the fund between the month t-1 and month t, which has not occurred due to the return of the fund in the month t.

$$\text{Flow}_t^i = \frac{\text{TNA}_t^i - \text{TNA}_{t-1}^i(1 + R_t^i)}{\text{TNA}_{t-1}^i}$$

where,  $\text{Flow}_t^i$  is the relative change in total net assets corrected for the return,  $\text{TNA}_t^i$  is the fund's total net assets in month t and  $R_t^i$  is the fund's return in month t. Since investors receive information about star rating changes each month (Morningstar, 2008), we observe the flow in the month-end following a change. For example, if a change occurs in the 5<sup>th</sup> of July the first possible effect by the change is in the month-end of July.

## 4. Methodology

### A. Event Study

In accordance with Del Guercio and Tkac (2008) we conduct an event-study where each change in star ratings represents one event. This is an efficient method to examine the existence of abnormal flow due to a rating change. Historically this approach has been applied for similar research of abnormal stock returns (see, e.g., Fama *et al.*, 1969; Patell, 1976; Dodd, 1980; Brown and Warner, 1980, 1985; Dodd and Warner, 1983; Boehmer *et al.*, 1991; Kothari and Warner 1997; Lyon *et al.*, 1999).

### B. Benchmark regression

Similar to Del Guercio and Tkac (2008) we apply a time-series benchmark regression to estimate the fund's normal flow for each individual event. Del Guercio and Tkac (2008) include a style category coefficient within their benchmark regression. However, since Morningstar has changed their category

system and increased the number of categories from 19 to more than 100 categories (Morningstar, 2014) and since our sample consists of 550 funds, we argue that we have too few funds per category which will skew the result. Hence we omit the style category coefficient. As a result of this we estimate the following regression:

$$\text{Flow}_t^i = \gamma^i + \beta_1^i \text{Ret}_{t-1}^i + \beta_2^i \text{Flow}_{t-1}^i + \beta_3^i \Delta\alpha_{t-1}^i + \beta_4^i (\Delta\alpha_{t-1}^i)^2 + \varepsilon_t^i$$

where,  $\text{Flow}_t^i$  is the flow to fund  $i$  at month  $t$ ,  $\text{Ret}_{t-1}^i$  is fund  $i$ 's return at time  $t - 1$ ,  $\text{Flow}_{t-1}^i$  is the flow to fund  $i$  at month  $t - 1$  and  $\Delta\alpha_{t-1}^i$  is the change in Jensen's alpha for fund  $i$  between  $t - 1$  and  $t - 2$ . We include a squared term of the change in alpha to correct for a potential convex relationship.

In our event study we define the month of change in star rating as event time 0. Further, our estimation period consists of 12 months of data, starting from 14 months before event time 0, ending in three months before event time 0.<sup>2</sup> To calculate the change in Jensen's alpha, we use the benchmark OMX SPI as market index with 12 months rolling window and a Swedish 3-month treasury bill as risk-free rate. Jensen's alpha is calculated as:

$$\alpha_t^i = r_t^i - [r_t^f + \beta_t^i (r_t^m - r_t^f)]$$

where,  $\alpha_t^i$  is Jensen's alpha in month  $t$ ,  $r_t^i$  is the fund  $i$ 's return in month  $t$ ,  $r_t^f$  is the risk-free return in month  $t$ ,  $r_t^m$  is the market return in month  $t$  and  $\beta_t^i$  is the fund  $i$ 's beta in month  $t$ .

### C. Abnormal flow

Abnormal flow is the percentage difference between the actual flow in the event period and the expected flow from the estimation period. In contrast to Del Guercio and Tkac (2008) we argue that abnormal flow in percentage form is

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<sup>2</sup> Del Guercio and Tkac (2008) argue that the quantitative results are very similar when they vary the length of an estimation period of 12 to 36 months.

preferable due to large differences in fund size. Hence, we estimate the abnormal flow through the following equation:

$$\text{Abnormal Flow}_t^i = \text{Flow}_t^i - \hat{\gamma}^i - \hat{\beta}_1^i \text{Ret}_{t-1}^i - \hat{\beta}_2^i \text{Flow}_{t-1}^i - \hat{\beta}_3^i \Delta \alpha_{t-1}^i - \hat{\beta}_4^i (\Delta \alpha_{t-1}^i)^2$$

Abnormal flow is defined as the difference between actual flow for fund  $i$  at month  $t$  and the average abnormal flow into a fund,  $\hat{\gamma}^i$ , the lagged return, the lagged flow, the difference in Jensen's alpha and the squared change in Jensen's alpha. We group the funds into eight different categories dependent on the event, for example we define one event as a change from one to two stars or five to four stars etc. In that sense we can measure the effect of the event for the different categories statistically.

## D. Statistical test

In our statistical test we use an event window that reaches from the event-month to six months after the rating change (month 0 to +6). The reason for the seven month event window is that we argue that casual investors do not monitor the funds on a monthly basis. Hence, the effect on fund flow may persist for several months. This is in contrast to the efficient market hypothesis that implies an immediate reaction to new information (see e.g., Fama *et al.*, 1969; Fama, 1970).

We will conduct both a standardized and non-standardized cross-sectional test to examine the effect of a star rating change on fund flow. Boehmer *et al.* (1991) argue that the standardized test is preferable, since it is more robust in comparison to the ordinary cross sectional test. Unlike the ordinary cross-sectional test, the standardized test uses information from the estimation period that enhances the efficiency and power of the test. Further, they argue that the ordinary cross-sectional test rejects the null hypothesis of no abnormal return too often while the standardized test rejects the hypothesis with higher accuracy. However, they discuss that the ordinary cross-sectional test is functional when the residuals are uncorrelated. Hence, we argue that it is of interest to examine

whether there exists any differences between the outcomes of the standardized and the ordinary cross sectional test.

In accordance with Del Guercio and Tkac (2008) we standardize the abnormal flow by applying the method of Dodd and Warner (1983). The standardized method has the advantage of preventing a few funds with large sample variances from driving the result. In particular funds with lower forecast variance are weighted more heavily in the standardized method (Patell 1976). Following the approach of Brown and Warner (1980, 1985), Dann (1981), Holthausen (1981), Leftwich (1981) and Dodd and Warner (1983), we standardize the abnormal flow by the estimated forecast variance (RMSE) of the abnormal flow for each month. Appendix reports the formula used to standardize abnormal flows.

Further, cumulative non-standardized and standardized abnormal flows are estimated. These are computed by summing each fund's abnormal flows from event-month 0 to +6, for example from 0 to +2 or 0 to +4 etc., and dividing by the square root of number of months used in the cumulation (Appendix). Additionally, we calculate average non-standardized and standardized abnormal flow ( $AAF_t$  and  $ASTAF_t$ ) and average cumulative non-standardized and standardized abnormal flow ( $ACAF_t$  and  $ACSTAF_t$ ).<sup>3</sup> For each event-month the average abnormal flows are calculated by averaging across all funds that experience the same type of event (see e.g., Dodd and Warner, 1983; Seiler, 2000).

We use the ordinary cross-sectional test to access statistical significance for  $AAF_t$  and  $ACAF_t$ . The statistical significance is tested by dividing the average abnormal flow with its contemporaneous standard error (see, e.g., Charest, 1978; Penman, 1982). In addition to this test we use the standardized cross-sectional test by Boehmer *et al.* (1991). Particularly we divide  $ASTAF_t$  and  $ACSTAF_t$  with its contemporaneous standard error to access statistical significance. Appendix contains all formulas for the statistical tests. In addition to these two tests we

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<sup>3</sup>  $AAF_t = \frac{\sum_{i=1}^N AF_{it}}{N}$ .  $ASTAF_t$ ,  $ACAF_t$  and  $ACSTAF_t$  are calculated analogously.

also conduct a nonparametric  $\chi^2$  test under the null hypothesis that 50% of sample funds have positive standardized abnormal flow.

## 5. Result and discussion

We have conducted an event study to evaluate if the actual flow is significantly different from the predicted flow during the period November 2009 to December 2015. Hence, we are testing whether the null hypothesis of zero abnormal flow holds. Panels A and B of Table 2 present the ASTAF for all star rating changes from event month 0 to 6. Further, panels C and D present the corresponding estimates for ACSTAF.

TABLE 2

### Morningstar Star Rating Changes of Swedish Mutual Funds

Panels A and B present the average standardized abnormal flow (ASTAF<sub>t</sub>) from event month 0 to 6. ASTAF<sub>t</sub> is averaged across all funds, which have experienced the same type of event, for example one to two, five to four etc. ASTAF<sub>t</sub> is defined as the difference in percentage flow between actual and predicted flow for each month t, where predicted flow is estimated by the benchmark regression. In the benchmark regression, flow is regressed on its return in time t - 1, its time t - 1 flow, its change in Jensen's alpha from t - 2 to t - 1 and its change in Jensen's alpha from t - 2 to t - 1 squared. Flows are standardized by the estimated forecast variance (RMSE). To estimate the benchmark regression we use an estimation period from month -14 to -3. The t-stat is calculated by dividing ASTAF<sub>t</sub> by its contemporaneous standard error, reported in appendix. ASTAF significantly different from zero at the 10 % level or higher in a two-tailed t-test is bolded. The symbols, \*, \*\* and \*\*\*, indicate statistical significance at 10, 5 and 1 % level. Further, we report the proportion of positive abnormal flow for each event month t. All event months that differ from the assumption of 50 % positive abnormal flow at the 5 % significance level are bolded, using a  $\chi^2$  test with one degree of freedom.

#### Panel A. Average Standardized Abnormal Flow for Rating Upgrades

Event Month	From 1 to 2 Stars (N = 120)			From 2 to 3 Stars (N = 299)			From 3 to 4 Stars (N = 418)			From 4 to 5 Stars (N = 207)		
	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0
0	0,122	0,387	0,517	-0,078	-0,130	0,472	0,318	1,533	0,471	0,278	1,304	0,464
1	-0,078	-0,341	0,442	-0,545	-1,286	<b>0,569</b>	0,028	0,174	0,481	-0,872	-1,275	0,464
2	-0,056	-0,199	0,517	-0,127	-0,276	0,505	<b>-2,512</b> *	-1,667	0,493	-0,549	-1,217	0,507
3	-0,852	-1,474	0,492	-0,100	-0,302	0,468	-0,078	-0,110	0,488	-0,042	-0,238	0,507
4	-0,879	-0,968	0,458	-0,322	-1,447	0,472	0,438	0,765	0,505	-0,334	-1,396	0,444
5	-0,491	-0,748	0,500	0,153	0,633	0,522	-0,095	-0,509	0,502	-0,104	-0,241	0,488
6	-3,319	-1,571	0,425	-1,007	-1,121	<b>0,415</b>	-0,211	-0,847	0,483	-0,207	-0,699	0,449

#### Panel B. Average Standardized Abnormal Flow for Rating Downgrades

Event Month	From 2 to 1 Stars (N = 137)			From 3 to 2 Stars (N = 317)			From 4 to 3 Stars (N = 445)			From 5 to 4 Stars (N = 227)		
	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0	ASTAF <sub>t</sub>	t-Stat	% > 0
0	<b>-0,535</b> **	-2,449	0,431	-0,219	-0,565	0,467	0,144	0,790	0,458	<b>0,329</b> **	2,000	0,524
1	0,074	0,563	0,489	<b>-0,887</b> **	-2,268	0,486	0,151	0,858	0,465	-0,018	-0,097	0,445
2	-0,508	-1,327	0,460	-0,400	-1,385	0,511	<b>-0,285</b> **	-2,010	<b>0,429</b>	0,235	1,239	0,471
3	<b>-0,398</b> *	-1,734	<b>0,409</b>	0,164	0,516	0,467	-0,762	-1,255	0,490	0,132	0,367	<b>0,427</b>
4	-3,468	-1,265	0,445	0,020	0,082	<b>0,442</b>	<b>-0,663</b> *	-1,663	0,472	-1,353	-1,561	<b>0,414</b>
5	-2,449	-1,571	0,445	-1,711	-0,988	0,473	-0,248	-1,185	0,465	0,137	0,301	0,493
6	<b>-1,618</b> **	-2,287	0,423	<b>-0,578</b> *	-1,850	0,479	-0,300	-1,430	<b>0,438</b>	0,094	0,207	0,441

TABLE 2 (Continued)

**Morningstar Star Rating Changes of Swedish Mutual Funds**

Panels C and D present the average cumulative standardized abnormal flow (ACSTAF<sub>t</sub>) from event month 0 to 6. The cumulative abnormal flows are calculated by summing the standardized abnormal flow from month 0 to t, then its divided by the square root of the number of months, t. ACSTAF<sub>t</sub> is averaged across all funds, which have experienced the same type of event, for example one to two, five to four etc. Flows are standardized by the estimated forecast variance (RMSE). The t-stat is calculated by dividing ACSTAF<sub>t</sub> by its contemporaneous standard error, reported in appendix. ACSTAF significantly different from zero at the 10 % level or higher in a two-tailed t-test is bolded. The symbols, \*, \*\* and \*\*\*, indicate statistical significance at 10, 5 and 1 % level. Further, we report the proportion of positive abnormal flow for each event month t. All event months that differ from the assumption of 50 % positive abnormal flow at the 5 % significance level are bolded, using a  $\chi^2$  test with one degree of freedom.

**Panel C. Average Cumulative Standardized Abnormal Flow for Rating Upgrades**

Event Month	From 1 to 2 Stars (N = 120)			From 2 to 3 Stars (N = 299)			From 3 to 4 Stars (N = 418)			From 4 to 5 Stars (N = 207)		
	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0
0	0,122	0,387	0,517	-0,078	-0,130	0,472	0,318	1,533	0,471	0,278	1,304	0,464
1	0,031	0,131	0,533	-0,440	-0,968	0,505	0,245	1,110	0,476	-0,420	-0,815	0,454
2	-0,007	-0,026	0,525	-0,433	-0,799	0,502	-1,250	-1,400	0,500	-0,660	-1,003	0,483
3	-0,432	-1,087	0,467	-0,425	-0,844	0,502	-1,122	-1,319	0,471	-0,592	-0,986	0,517
4	-0,780	-1,310	0,458	-0,524	-1,085	0,475	-0,807	-1,141	0,488	-0,679	-1,235	0,473
5	-0,913	-1,225	0,450	-0,416	-0,898	0,502	-0,776	-1,191	0,490	-0,662	-1,231	0,512
6	<b>-2,099</b> **	-1,965	0,408	-0,765	-1,404	0,495	-0,798	-1,301	0,483	-0,692	-1,375	0,483

**Panel D. Average Cumulative Standardized Abnormal Flow for Rating Downgrades**

Event	From 2 to 1 Stars (N = 137)			From 3 to 2 Stars (N = 317)			From 4 to 3 Stars (N = 445)			From 5 to 4 Stars (N = 227)		
	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0	ACSTAF <sub>t</sub>	t-Stat	% > 0
0	<b>-0,535</b> **	-2,449	0,431	-0,219	-0,565	0,467	0,144	0,790	0,458	<b>0,329</b> *	2,000	0,524
1	<b>-0,326</b> *	-1,719	0,438	-0,782	-1,623	0,445	0,208	1,310	0,472	0,219	1,175	0,485
2	<b>-0,560</b> **	-2,135	0,416	<b>-0,870</b> *	-1,803	0,502	0,006	0,038	0,456	<b>0,315</b> *	1,823	0,529
3	<b>-0,684</b> **	-2,316	<b>0,401</b>	-0,671	-1,493	0,495	-0,376	-1,124	0,458	0,338	1,598	0,502
4	<b>-2,163</b> *	-1,723	<b>0,401</b>	-0,591	-1,445	0,454	-0,633	-1,409	0,467	-0,302	-0,711	0,502
5	<b>-2,974</b> *	-1,723	<b>0,350</b>	-1,238	-1,514	0,473	-0,679	-1,560	0,456	-0,220	-0,763	0,507
6	<b>-3,390</b> **	-2,051	<b>0,343</b>	-1,365	-1,636	0,470	<b>-0,742</b> *	-1,796	0,461	-0,168	-0,709	0,493

Overall we do not experience any significant abnormal flow for either ASTAF or ACSTAF. Specifically upgrades only have one significant month of abnormal flow for both ASTAF and ACSTAF. Further, downgrades experience more months of significance. For ASTAF we experience eight significant event months while ACSTAF have eleven months of significance. Note that all months are significant for ACSTAF conditional on a downgrade from two to one, where four months are significant at 5 % significance level and the remaining three are significant at 10 % significance level. The downgrade from two to one is also the most significant type of event for ASTAF, where three out of seven months can reject the null hypothesis of zero abnormal flow at 10 or 5 % significance level. We experience negative abnormal flows for all significant months except for the downgrade from five to four stars. The significant months for the downgrade from five to four experience positive abnormal flows for both ASTAF and ACSTAF, which partly is consistent with the work of Del Guercio and Tkac (2008). Del Guercio and Tkac (2008) found support that fund companies advertise four-star rating as high quality. This might be a reason for the positive abnormal flow in event-month 0 and +2. In other words, casual investors recognise a four-star fund as high quality and are therefore prone to still invest in that fund. However, the



$\chi^2$  test does not support the aforementioned findings. Additionally, we compute the proportion of positive abnormal flow. The distribution is evaluated by a nonparametric  $\chi^2$  test. Overall, there are few significant event months under the  $\chi^2$  test. However, the  $\chi^2$  test yields a confirmatory evidence that the largest proportion of abnormal flows are negative for event months 3 to 6 for the downgrade from two to one star. Hence, investors might have a lagged reaction to the change in star rating.

In contrast to Del Guercio and Tkac (2008) we also examine the effect for average abnormal flow and average cumulative abnormal flow. Hence, we are testing whether the null hypothesis of zero abnormal flow holds for non-standardized abnormal flows. Abnormal flows would not be computed accurately if the variance of the flow variable would be low relative to its mean. Therefore, we provide summary statistics of the mean and variance of the flow variable in the table beneath.

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**Table 3**  
**Mean and Variance of Flow Variable**

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Morningstar star rating change	Mean	Variance
1 to 2	-0,004	0,010
2 to 3	-0,001	0,009
3 to 4	0,002	0,010
4 to 5	0,006	0,012
2 to 1	-0,005	0,011
3 to 2	-0,002	0,011
4 to 3	0,003	0,011
5 to 4	0,003	0,011

Since the variance of the flow variable is high relative to its mean it is motivated to examine non-standardized abnormal flows. Panels A and B of table 4 present the AAF for all star rating changes from event month 0 to 6. Further, panels C and D present the corresponding estimates for ACAF.

TABLE 4

## Morningstar Star Rating Changes of Swedish Mutual Funds

Panels A and B present the average abnormal flow (AAF<sub>t</sub>) from event month 0 to 6. AAF<sub>t</sub> is averaged across all funds, which have experienced the same type of event, for example one to two, five to four etc. AAF<sub>t</sub> is defined as the difference in percentage flow between actual and predicted flow for each month *t*, where predicted flow is estimated by the benchmark regression. In the benchmark regression, flow is regressed on its return in time *t* - 1, its time *t* - 1 flow, its change in Jensen's alpha from *t* - 2 to *t* - 1 and its change in Jensen's alpha from *t* - 2 to *t* - 1 squared. To estimate the benchmark regression we use an estimation period from month -14 to -3. The t-stat is calculated by dividing AAF<sub>t</sub> by its contemporaneous standard error, reported in appendix. AAF significantly different from zero at the 10 % level or higher in a two-tailed t-test is bolded. The symbols, \*, \*\* and \*\*\*, indicate statistical significance at 10, 5 and 1 % level. Further, we report the proportion of positive abnormal flow for each event month *t*. All event months that differ from the assumption of 50 % positive abnormal flow at the 5 % significance level are bolded, using a  $\chi^2$  test with one degree of freedom.

## Panel A. Average Abnormal Flow for Rating Upgrades

Event Month	From 1 to 2 Stars (N = 120)			From 2 to 3 Stars (N = 299)			From 3 to 4 Stars (N = 418)			From 4 to 5 Stars (N = 207)		
	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0
0	0,009	0,911	0,517	-0,029	-1,378	0,472	0,010	1,173	0,471	0,035	1,453	0,464
1	0,007	0,473	0,442	-0,018	-0,561	<b>0,569</b>	-0,007	-0,547	0,481	0,010	0,540	0,464
2	0,003	0,296	0,517	0,026	0,886	0,505	-0,037	-1,392	0,493	-0,006	-0,376	0,507
3	-0,015	-1,150	0,492	-0,019	-0,960	0,468	-0,032	-1,566	0,488	-0,002	-0,187	0,507
4	-0,013	-1,092	0,458	<b>-0,019</b> **	-1,965	0,472	0,009	0,589	0,505	-0,016	-1,274	0,444
5	0,003	0,198	0,500	0,008	0,750	0,522	-0,010	-0,555	0,502	-0,006	-0,426	0,488
6	-0,273	-1,102	0,425	-0,011	-0,410	<b>0,415</b>	0,001	0,146	0,483	0,000	0,007	0,449

## Panel B. Average Abnormal Flow for Rating Downgrades

Event Month	From 2 to 1 Stars (N = 137)			From 3 to 2 Stars (N = 317)			From 4 to 3 Stars (N = 445)			From 5 to 4 Stars (N = 227)		
	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0	AAF <sub>t</sub>	t-Stat	% > 0
0	<b>-0,017</b> *	-1,852	0,431	0,001	0,056	0,467	0,000	0,052	0,458	0,019	1,019	0,524
1	0,005	0,526	0,489	<b>-0,061</b> *	-1,941	0,486	0,010	0,779	0,465	0,003	0,312	0,445
2	-0,012	-1,126	0,460	-0,015	-1,386	0,511	<b>-0,015</b> *	-1,849	<b>0,429</b>	-0,001	-0,088	0,471
3	-0,018	-1,533	<b>0,409</b>	0,023	0,544	0,467	-0,008	-0,599	0,490	-0,009	-0,827	<b>0,427</b>
4	-0,288	-1,066	0,445	0,033	1,363	<b>0,442</b>	<b>-0,019</b> **	-2,342	0,472	<b>-0,021</b> **	-1,960	<b>0,414</b>
5	-0,168	-1,238	0,445	<b>-0,017</b> **	-2,140	0,473	-0,012	-1,471	0,465	<b>-0,023</b> *	-1,664	0,493
6	-0,024	-1,603	0,423	-0,016	-1,632	0,479	-0,010	-0,359	<b>0,438</b>	-0,012	-1,135	0,441

TABLE 4 (Continued)

## Morningstar Star Rating Changes of Swedish Mutual Funds

Panels C and D present the average cumulative abnormal flow (ACAF<sub>t</sub>) from event month 0 to 6. The cumulative abnormal flows are calculated by summing the abnormal flow from month 0 to *t*, then its divided by the square root of the number of months, *t*. ACAF<sub>t</sub> is averaged across all funds, which have experienced the same type of event, for example one to two, five to four etc. The t-stat is calculated by dividing ACAF<sub>t</sub> by its contemporaneous standard error, reported in appendix. ACAF significantly different from zero at the 10 % level or higher in a two-tailed t-test is bolded. The symbols, \*, \*\* and \*\*\*, indicate statistical significance at 10, 5 and 1 % level. Further, we report the proportion of positive abnormal flow for each event month *t*. All event months that differ from the assumption of 50 % positive abnormal flow at the 5 % significance level are bolded, using a  $\chi^2$  test with one degree of freedom.

## Panel C. Average Cumulative Abnormal Flow for Rating Upgrades

Event Month	From 1 to 2 Stars (N = 120)			From 2 to 3 Stars (N = 299)			From 3 to 4 Stars (N = 418)			From 4 to 5 Stars (N = 207)		
	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0
0	0,009	0,911	0,517	-0,029	-1,378	0,472	0,010	1,173	0,471	0,035	1,453	0,464
1	0,011	0,926	0,533	-0,033	-1,204	0,505	0,002	0,192	0,476	0,032	1,409	0,454
2	0,011	0,907	0,525	-0,012	-0,373	0,502	-0,020	-1,097	0,500	0,023	1,044	0,483
3	0,002	0,170	0,467	-0,020	-0,683	0,502	-0,033	-1,394	0,471	0,019	0,858	0,517
4	-0,004	-0,280	0,458	-0,027	-0,964	0,475	-0,025	-1,111	0,488	0,009	0,450	0,473
5	-0,002	-0,146	0,450	-0,021	-0,809	0,502	-0,027	-1,081	0,490	0,006	0,293	0,512
6	-0,105	-1,116	0,408	-0,024	-0,994	0,495	-0,025	-0,971	0,483	0,006	0,236	0,483

## Panel D. Average Cumulative Abnormal Flow for Rating Downgrades

Event Month	From 2 to 1 Stars (N = 137)			From 3 to 2 Stars (N = 317)			From 4 to 3 Stars (N = 445)			From 5 to 4 Stars (N = 227)		
	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0	ACAF <sub>t</sub>	t-Stat	% > 0
0	<b>-0,017</b> *	-1,852	0,431	0,001	0,056	0,467	0,000	0,052	0,458	0,019	1,019	0,524
1	-0,009	-0,934	0,438	<b>-0,043</b> *	-1,873	0,445	0,008	0,758	0,472	0,015	1,195	0,485
2	-0,014	-1,233	0,416	<b>-0,044</b> **	-2,075	0,502	-0,002	-0,222	0,456	0,012	0,836	0,529
3	<b>-0,021</b> *	-1,694	<b>0,401</b>	-0,027	-0,971	0,495	-0,006	-0,478	0,458	0,006	0,394	0,502
4	-0,148	-1,216	<b>0,401</b>	-0,009	-0,273	0,454	-0,014	-1,096	0,467	-0,004	-0,288	0,502
5	-0,204	-1,226	<b>0,350</b>	-0,015	-0,502	0,473	-0,017	-1,403	0,456	-0,013	-0,882	0,507
6	-0,200	-1,298	<b>0,343</b>	-0,020	-0,710	0,470	-0,020	-1,171	0,461	-0,017	-1,100	0,493

Overall we do not experience any abnormal flows for either AAF or ACAF. In comparison to the standardized test we experience less significant event months. Specifically, we only experience one significant month for upgrades for AAF, while we do not experience any significant month at all for ACAF. For downgrades, AAF experiences seven significant event months, while ACAF only

have four months of significance. Consistent with our expectation for downgrades, the sign of all average abnormal flows and average cumulative abnormal flows are negative. All event months following downgrades, which experience significance at the nonparametric  $\chi^2$  test has a majority of negative abnormal flows. Hence, our results are consistent with the findings of Patell (1976), Masulis (1980), Dodd and Warner (1983) and Boehmer *et al.* (1991). They argue that the standardized test outperform the non-standardized test. The standardized test is also preferable since it is more robust (Boehmer *et al.*, 1991) in comparison to the ordinary cross-sectional test.

Overall we cannot find a universal statistically or economically significant relationship between a star rating change and the inflows or outflows from mutual funds on the Swedish fund market. However, the downgrade from two to one star is an exception. Further, we cannot find any statistical significance for the distribution of positive abnormal flow using the  $\chi^2$  test.

The absence of significant results might be an effect of a diminishing influence of Morningstar. Since the research of Del Guercio and Tkac (2008), the internet has exploded. Nowadays investors can collect information and analyses everywhere. Even though large banks in Sweden still uses Morningstar's star rating, we argue that it is a quality control for the casual investor rather than a decision-making tool. Instead we argue that that newspapers, blogs, podcasts etc. might be more frequently used when casual investors make decisions about their capital allocations. Further, nowadays the casual investors are aware about the fact that historical performance cannot predict future performance. Instead, they use the historical performance as a measure of quality. This motivates the significant results of a drop in rating from two to one star. When a fund receives one star it is ranked the bottom 10 %, hence recognised as junk quality. Thus, the junk quality induces casual investors to abandon the low performing fund for other alternatives. Due to the absence of significant result we can dismiss our concern about fund managers' risk-taking behaviour.

## 6. Summary and Conclusion

In a world of rapidly expanding fund markets, Morningstar has grown to become the world's most recognized rating company for mutual funds and equity. The interest for mutual funds among casual investors is constantly growing but due to their lack of expertise in the financial markets, quality control from an unbiased source has become very important. Hence, Morningstar's star rating system has become a low-cost and accessible quality control for casual investors. Therefore, the purpose of this paper has been to examine whether the rating system influence casual investors' decision-making on the Swedish mutual fund market. Thus, we use an event-study approach to examine the effect on fund flow due to a change in the star rating.

In contrast to Del Guercio and Tkac (2008) we cannot validate that this effect exists on the Swedish mutual fund market. In our statistical tests we found a few significant event-months but overall they are too weak to conclude a significant effect on the fund flow due to a change in star rating. However, the standardized test indicated high significance for the downgrade from two stars to one for ASTAF and ACSTAF. Specifically, every event month was statistically significant on a 10 % significance level for ACSTAF following the downgrade. Thus, we conclude that the only time the star rating change has an effect on the Swedish mutual fund market is when a fund reaches junk-status (one star rating).

Since the research period examined by Del Guercio and Tkac (2008) the use of internet has exploded. Further, the awareness among casual investors that historical performance cannot predict future performance has increased. As a result of this, we conclude that Morningstar's star rating is rather used as a quality control than a decision-making tool. We argue that casual investors might use other sources such as newspapers, blogs and podcasts to access information about investment allocations. According to this, we can dismiss our concern about fund manager's risk taking in order to receive higher earnings.

Further, it would be interesting for future research to examine whether publications within newspapers, blogs and podcasts would affect fund flow on the Swedish mutual fund market.

# Appendix

## Formulas

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Standardizing Formula

$$STAF_t^i = \frac{\text{Abnormal Flow}_t^i}{\sqrt{\frac{1}{n} \sum_{i=1}^n (\text{Flow}_t^i - \widehat{\text{Flow}}_t^i)^2}}$$

Cumulating Abnormal Flows

$$\text{Cumulative Abnormal Flow}_t^i = \frac{\sum_{i=0}^t \text{Abnormal Flow}_t^i}{\sqrt{t+1}}$$

Standardized Cross-Sectional T-test

$$\frac{\frac{1}{n} \sum_{i=1}^n STAF_t^i}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^n (STAF_t^i - \sum_{i=1}^n \frac{STAF_t^i}{n})^2}}$$
$$\frac{\frac{1}{n} \sum_{i=1}^n CSTAF_t^i}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^n (CSTAF_t^i - \sum_{i=1}^n \frac{CSTAF_t^i}{n})^2}}$$

Ordinary Cross-Sectional T-test

$$\frac{\frac{1}{n} \sum_{i=1}^n AF_t^i}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^n (AF_t^i - \sum_{i=1}^n \frac{AF_t^i}{n})^2}}$$
$$\frac{\frac{1}{n} \sum_{i=1}^n CAF_t^i}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^n (CAF_t^i - \sum_{i=1}^n \frac{CAF_t^i}{n})^2}}$$

# References

## Websites

Dorsey, Pat. 2008. *FAQ*. Morningstar.  
<http://news.morningstar.com/articlenet/article.aspx?id=4982>. (2016-02-23).

Morningstar. 2008. *The Morningstar Rating for Funds*. Morningstar.  
[http://corporate.morningstar.com/es/documents/MethodologyDocuments/FactSheets/MorningstarRatingForFunds\\_FactSheet.pdf](http://corporate.morningstar.com/es/documents/MethodologyDocuments/FactSheets/MorningstarRatingForFunds_FactSheet.pdf). (2016-02-23).

Morningstar. 2014. *The Morningstar Category Classification*.  
[http://corporate.morningstar.com/us/documents/MethodologyDocuments/MethodologyPapers/MorningstarCategory\\_Classifications.pdf](http://corporate.morningstar.com/us/documents/MethodologyDocuments/MethodologyPapers/MorningstarCategory_Classifications.pdf). (2016-02-23)

Swedbank Robur. 2016. *Fondbetyg och ranking*.  
<http://www.swedbankrobur.se/om-swedbank-robur/utmarkelser/fondbetyg-och-ranking/index.htm>. (2016-03-03)

## Academic Papers

Boehmer, Musumeci and Poulsen. 1991. *Event-Study Methodology under Conditions of Event-Induced Variance*. Journal of Financial Economics. Vol 30. Issue 2, 253-272.

Brown and Warner. 1980. *Measuring Security Price Performance*. Journal of Financial Economics. Vol. 8. Issue 3, 205-258.

Brown and Warner. 1985. *Using Daily Stock Returns: The Case of Event Studies*. Journal of Financial Economics. Vol. 14. Issue. 1, 3-31.

Charest. 1978. *Dividend Information, Stock Returns and Market Efficiency – II*. Journal of Financial Economics. Vol. 6. Issue 2 – 3, 297-330.

Chevalier and Ellison. 1997. *Risk Taking by Mutual Funds as a Response to Incentives*. Journal of Political Economy. Vol. 105, 1167-1200.

Dann. 1981. *Common Stock Repurchases: An Analysis of Returns to Bondholders and Stockholders*. Journal of Financial Economics. Vol. 9. Issue 2, 113-138.

Del Guercio and Tkac. 2008. *Star Power: The Effect of Morningstar Ratings on Mutual Fund Flow*. Journal of Financial and Quantitative Analysis. Vol. 43. No. 4. Seattle. University of Washington, 907-936.

Dodd. 1980. *Merger Proposals, Management Direction and Stockholder Wealth*. Journal of Financial Economics. Vol. 8. Issue 2, 105-137.

- Dodd and Warner. 1983. *On Corporate Governance: A Study of Proxy Contests*. Journal of Financial Economics. Vol. 11. Issues. 1 – 4, 401-438.
- Fama. 1970. *Efficient Capital Markets: A Review of Theory and Empirical Work*. The Journal of Finance. Vol. 25. No 2, 383-417.
- Fama, Fisher, Jensen and Roll. 1969. *The Adjustment of Stock Prices to New Information*. International Economic Review. Vol. 10. No. 1, 1-21.
- Ferreira, Keswani, Miguel and Ramos. 2012. *The Determinants of Mutual Fund Performance: A Cross-Country Study*. Review of Finance. Oxford: Oxford University Press,1-43.
- Holthausen. 1981. *Evidence on the Effect of Bond Covenants and Management Compensation Contracts on the Choice of Accounting Techniques: The Case of Depreciation Switch-Back*. Journal of Accounting and Economics. Vol. 3. Issue. 1, 73-109.
- Huang, Wei and Yan. 2007. *Participation Cost and the Sensitivity of Fund Flow to Past Performance*. The Journal of Finance. Vol. 62. Issue 3, 1273-1311
- Jun, Li, Yan and Zhang. 2014. *Flow-Performance Relationship and Star Effect: New Evidence from Chinese Mutual Funds*. Emerging Markets Finance and Trade. Volume. 50. Issue 3, 81-101.
- Khorana. 1996. *Top Management Turnover: An Empirical Investigation of Mutual Fund Managers*. Journal of Financial Economics. Vol. 40. Issue 3, 403-427.
- Kothari and Warner. 1997. *Measuring Long-Horizon Security Price Performance*. Journal of Financial Economics. Vol. 43. Issue. 3, 301-339
- Leftwich. 1981. *Evidence of the Impact of Mandatory Changes in Accounting Principles on Corporate Loan Agreements*. Journal of Accounting and Economics. Vol. 3. Issue. 1, 3-36.
- Masulis. 1980. *The Effects of Capital Structure Change on Security Prices: A Study of Exchange Offers*. Journal of Financial Economics. Vol. 8. Issue. 2, 139-178.
- Patell. 1976. *Corporate Forecasts of Earnings per Share and Stock Price Behaviour: Empirical Test*. Journal of Accounting Research. Vol. 14. No. 2, 246-276.
- Penman. 1982. *Insider Trading and Dissemination of Firms' Forecast Information*. The Journal of Business. Vol. 55. No. 4, 479-503.
- Seiler. 2000. *The Efficacy of Event-Study Methodologies: Measuring Abnormal Performance Under Conditions of Induced Variance*. The Journal of Financial and Strategic Decisions. Vol. 13. No. 1, 101-112.



Sharpe. 1998. *Morningstar's Risk-Adjusted Ratings*. Financial Analyst Journal. Vol. 54. Issue. 4, 21-33

Sirri and Tufano. 1998. *Costly Search and Mutual Fund Flows*. The Journal of Finance. Vol LIII. No 5, 1589-1622.