Unbundled costs of transactions and external research as characteristics of actively managed Swedish mutual funds

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Abstract

Using a unique dataset of 85 actively managed Swedish mutual funds investing in the Swedish equity markets, we study fund characteristics regarding cost structures. We find that the highest spenders on external research are large cap funds not managed by banks. Funds that are managed by banks have better execution in terms of price, and lower transaction costs characterize better-performing funds. We find no relationship between expenditure on external research and abnormal return overall, however, we find suggestive evidence that the return of expenditure on external research increases between funds with more idiosyncratic risk. With the MiFID II directives about to unbundle transaction costs and costs for external research throughout the EU in 2018, this thesis sheds light on fund cost structures in an economy where unbundling occurred as early as 2015.

Keywords: mutual fund performance, MiFID II, sell-side research, unbundling, best execution, public information, investment analysis.

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1 Introduction

The European fund management and equity research industries are standing on the rim of their greatest change in decades with MiFID II regulatory changes taking effect in 2018[1]. Investment research has often been shared with fund managers and the costs thereof per se bundled with transaction fees from the sell-side institution providing both the execution of trades and the research. One of the changes caused by these new regulations is that these fees are unbundled. With Sweden as early as 2015 being the first country to unbundle costs of external analysis from other transaction costs, we use unique Swedish data to analyze cost structures for active mutual funds. Further, we analyze such cost structures as characteristics of well-performing funds.

For active Swedish mutual funds that invest only in Sweden, we have collected data of 85 funds over the time period of 2010–2016. We find that small and mid cap funds spend less on external research than do large cap funds—among those not managed by banks. Funds managed by banks have better (i.e. cheaper) execution, and lower transaction costs are associated with higher fund performance—complementing the evidence of bundled transaction costs already in the literature.

Sell-side research is based on collecting, analyzing and aggregating public information to price stocks for clients. The value of private information could be huge, for example during insider trading (Economist, 2017)—but what is the value of public information? Under at least the semi-strong efficient market hypothesis, stock prices should reflect all public and relevant information about the company and mispricings, if any, are adjusted quickly by the market, (Fama, 1991). Under such conditions, it would be extremely

[1]In response to Article 27(10)(a) of MiFID II (Directive 2014/65/EU of the European Parliament), ESMA has developed a regulation regarding, among other things, content of data to be published by execution venues, known as "Regulatory technical and implementing standards — Annex I, Chapter 9, RTS 27". This regulation was adopted by the European Commission on June 8, 2016 and published in the Official Journal of the European Union, 2017 L 87 on March 31, 2017 as 2017/575, taking effect January 3, 2018.

hard—or even impossible—for funds to generate consistent abnormal returns through analysts alone, as the value of public information would be close to zero. One important question that comes to life from the notion of an efficient market is why asset managers, such as mutual funds, would pay external analysts in an attempt to achieve abnormal return—and if they do.

We find no direct linear relationship between abnormal return and expenditure on external research, however, a puzzling find is that the biggest spenders on external research take on very little idiosyncratic risk, and over-performing funds take on more idiosyncratic risk in general. Evidence in this thesis further suggests that expenditure on external research and abnormal return are more positively correlated between funds for higher levels of fund idiosyncratic risk.

The findings in this thesis could be of interest as evidence for—or for discussions around—sell-side efficiency, information acquisition by fund management, and information inefficiencies in Swedish capital markets. Looking to Sweden in the wake of unbundling may also help sell-side institutions in other jurisdictions predict potential changes in clientele or necessary product adjustments. Buy-side institutions on the other hand, can get an idea of their future cost structure. Unbundled cost structures as characteristics of high- or low-performing mutual funds can, in combination with more traditional fund attributes such as management fees, tenure and fund size, also give indications to investors about average fund performance. Neither differences in unbundled cost structures between funds nor unbundled cost structures as characteristics of better-performing funds have, to our knowledge, been studied before.

2 Literature Review

This section first covers attributes that distinguish funds with abnormal return. Secondly, information acquisition by fund management is reviewed, followed by theories about the possibility of abnormal returns. Finally, we discuss how this thesis fits into and contributes to the current literature.

Attributes of higher-performing funds A Swedish study by Dahlquist et al. (2000) and American studies by among others Chen et al. (2004) conclude that funds with lower levels of capital perform better. Higher performing funds have lower fees according to both Cooper et al. (2015) and Dahlquist et al. (2000), who furthermore characterize such funds with high turnover, historically high performance and low bundled transaction costs.

This thesis contributes to the literature by studying the potentially performance-linked attributes of unbundled transaction costs and costs of external research. This has to our knowledge not been studied before.

Information acquisition by fund management Fund managers use a range of sources as a basis for investment decisions and to reduce risks (Hellman, 2000; Coleman, 2015). Information acquisition from sell-side institutions has a negative impact on a fund's performance, according to a study by Fröberg (2016). Fröberg, however, concludes that information acquisition directly from the company itself has a positive impact on fund performance—a service sometimes provided by sell-side institutions. Switzer and Keushgerian (2013) likewise show that fund managers who make corporate visits and meet with firm management perform better than fund managers who do not make corporate visits. These studies quantify the value rather than the costs of information acquisition. This thesis attempts to do the latter for sell-side research and link it as a characteristic of fund performance.

Theories about the possibility of abnormal returns Under at least the semi-strong efficient market hypothesis, developed by Fama and Sharpe among others, it is impossible, except in the very short term, to acquire or aggregate public information that is valuable to the acquirer or other agents in the economy. Carhart (1997), Ippolito (1989) and Flam and Vestman (2014) all find a lack of support for the existence of skilled mutual fund managers or fund managers with an information advantage for Swedish and US data. In contrast, Grinblatt and Titman (1992) argues that historic performance of mutual funds is informative of future performance. The contribution to these studies is that we quantify the relationship between sell-side and buy-side institutions in characterizing funds that exhibit abnormal return.

Contribution to current research In this context it is of interest to investigate (i) what characterizes funds with different cost structures regarding expenditure on external analysis and transactions, and (ii) how such funds perform relative to others.

Much research has been done on the characteristics of funds that exhibit abnormal returns, information acquisition of funds as well as the track-record of external analysts. However, there is, to our knowledge, no empirical research investigating expenditures on external analysis nor pure transaction costs as it has been difficult—if at all possible—to quantify prior to unbundling.

This thesis finds characteristics of funds and should be associated with this part of the literature. We make no claim to causality of such characteristics, even if this will be discussed as a point of reference.

3 Methodology and Data

The Swedish fund market amounted to 1 398 funds in the end of 2016 with total net assets of just over 3 449 bSEK. The number of mutual funds that only invest in Sweden were to 125—with total net assets of about 550 bSEK (Swedish Investment Fund Association). We have sampled 85 funds which;

– are located in Sweden

– invest in Sweden—i.e. are found in the Morningstar categories 'Sweden Small/Mid Cap Equity' or 'Sweden Large-Cap Equity'

– are not managed by more than three fund managers, nor by a team—in order to capture a higher signal-to-noise ratio with funds more likely to use external analysts

– are actively managed—ensured by a visual inspection during sampling and data collection.

A unique dataset has been manually collected and contains over 4000 datapoints retrieved from the funds' annual reports over the years 2010–2016. The dataset only includes funds headquartered in Sweden to ensure that the funds are exposed to the new regulations. Another requirement is that the funds need to target Swedish investments. This is due to Swedish sell-side institutions being expected to facilitate the new regulations better. If funds that invest in other jurisdictions had been included, their sell-side institutions are less likely unbundling costs. Instead, fund management would need to estimate the portion of transaction costs attributable to research, producing a less reliable measure for this study. The sample is constrained to actively managed funds so that the premise for expenditures on external research is comparable among the funds.

From the financial statements of these funds, we have collected a unique dataset of yearly data on total net assets, turnover rate, bundled transaction costs, unbundled pure transaction costs, unbundled expenditure on external research, management fee, total expense ratio and derivatives use. These data have been collected for the sample on a yearly basis from 2010 to 2016. In addition to this, Morningstar categories have been collected for surviving funds and extinct funds been categorized by consulting financial reports or other statements. Whether the fund management firm for every fund has externally available equity research and trading departments within the same bank group has been collected as well. Details of variables are given in *Table 1.*

Variable	Definition
Total net assets (TNA)	All securities in the fund, cash and cash claims less liabilities. It is the market value of the fund share holders' total claims. Usually used as an average of year start and year end values. Measured in MSEK.
Turnover rate	The sum of the absolute value of all transactions divided by a fund's TNA at the point of transaction. [%-units]
Costs of external analysis	Covers external research but not in-house analysts. [kSEK]
Transaction costs	Compensation the fund pays to brokers for the purchase and sale of securities. For bundled reporting it includes costs for external analysis per se. [kSEK]
Pure transaction costs	Unbundled transaction costs, excluding costs of external analysis. [kSEK]
Rebundled transaction costs	Unbundled costs of transactions and analysis added together. [kSEK]
Bulge bracket bank	*Dummy* of management firm type where 1 indicates a bank with a trading department and an externally available equity analysis department. Other funds are called 'boutique' funds.
Small / Mid cap	*Dummy* of fund category where 1 indicates Morningstar category small/mid cap and 0 large cap. Note that these are the only two fund categories included in the sample.
Derivatives use	*Dummy* variable of whether a fund used derivatives during a year to some extent.
Abnormal return	Yearly gross return less an estimated normal return on a trailing 24 month rolling-beta basis. [%-units] Other estimates are used to check for robustness, see *Section A*.
Idiosyncratic risk	$1 - R^2$ from a regression fitting excess fund returns to a four factor model. See *Section A* for a more thorough description.

Table 1: Variable definitions.

3.1 Model Definitions and Hypotheses

Models will be defined to test how different types of funds differ in their cost structures, how transaction costs correlate with abnormal return and lastly how expenditures on external research fits as a characteristic of funds with higher abnormal return.

Explaining cost structures The primary model put forth in this thesis is a test of what characteristics funds have in regard to their unbundled expenditures on external analysis and transactions. The main regression looks like,

$$y_{it} = \beta_0 + \beta_b dBank_i + \beta_s dSM_i + \beta_{inter} \times dBank_i \times dSM_i + \beta_X \mathbf{X}_{it} + \epsilon_{it} \quad (1)$$

Here, y are measures of cost structure, $dBank$ is a dummy for "bulge bracket bank", which in this context is a variable that is 1 for funds whose management firm has its own brokerage department as well as its own (externally available) equity analysis department within the same bank group. These will often be referred to as "banks" in contrast to "boutiques"—even if the word might not semantically suggest a collectively exhaustive relationship to "banks". dSM is 1 for funds which, according to Morningstar categorization or the authors' judgment, target small/mid cap equity holdings over large cap ones. To simplify the notation in *Equation 1*, $\mathbf{X}$ is a vector made up of total net assets, turnover rate, TNA×turnover rate, a dummy for derivatives use, and year dummies to control for fixed effects. The interaction term for turnover rate and TNA is used to allow for different impacts to the y variable of turnover rate for different sizes of funds and different impacts of fund size for funds with different turnover rates. Concerning the $\mathbf{X}$ variables, we do not build our hypotheses for these variables, but they may be of interest to analyze anyway.

Furthermore, the fitted line of y, $\hat{y}$, features variable differences between fund category averages for the two firm types and between firm types for the two fund categories. Keeping $\mathbf{X}$ constant, β_b is the average difference between funds of bulge bracket banks and boutiques—for large cap funds—and $\beta_b + \beta_{inter}$ for small/mid cap funds. Under the same circumstances, β_s is the average difference between small/mid cap funds and large cap funds—for those that are boutique funds—while $\beta_s + \beta_{inter}$ exhibits the slope of dSM for funds managed by bulge bracket banks. A significance of $\hat{\beta}_{inter}$ to reject the null hypothesis that $\beta_{inter} = 0$ in the population, is strong evidence for different slopes of the bank dummy with different fund categories as well as differing slopes of the small/mid cap dummy given funds of different firm types.

The target variable y will first be set to the fraction of external analysis to rebundled transaction costs, i.e. $\frac{extan}{extan+txa}$, where $extan$ is costs of external analysis (research) and txa is pure transaction costs.

Notice that this first target variable, fraction of external analysis to rebundled transaction costs, measures two things at the same time; costs of external research and pure transaction costs. A significant difference between funds in explaining this variable might depend on one or the other of costs of external analysis and pure transaction costs—or both. Also, clearly, funds which differ by equal factors for the two costs will not be caught by this model.

Following this, the target variable will take the form of bundled and unbundled relative cost measures; $\frac{extan}{TNA}$ to measure costs of external analysis and $\frac{txa}{turnover}$ for pure transaction costs. A $\frac{tia}{turnover}$ regressand, where tia is bundled (and rebundled) transaction costs will be used as reference. Here, the measure for TNA is really the *average* of total net assets at year start and year end. Turnover is estimated by taking the recorded turnover ratio multiplied by average TNA.

Explaining external research For $y = \frac{extan}{TNA}$ the hypotheses are that bulge bracket banks spend less on external research in relation to total net assets for large cap funds, since they would have access to their own research department and large cap stocks are widely covered by banks. Furthermore, that small/mid cap boutique funds spend less on external research than other boutique funds, the idea being that they are more dependent on in-house research.

Since external research for small/mid cap equities might be scarce within the same bank group, we do not expect a significant difference in expenditure on external research for small/mid cap funds of different firm types, since the price advantage that bank funds have for large cap funds, will be wiped out. Difference in expenditure between small/mid cap targeted funds and large cap funds for banks is ambiguous as they would probably rely more on in-house analysis as any small-cap fund, however, they could get an increased price for having to look more outside the same banking group. This will explored rather than hypothesis-tested. The hypotheses to be tested are therefore:

$$H_0^1\colon\ \beta_b = 0 \qquad H_a^1\colon\ \beta_b < 0 \qquad\qquad H_0^2\colon\ \beta_s = 0 \qquad H_a^2\colon\ \beta_s < 0$$

Another way to look at these hypotheses is that we wish to test if large cap boutique funds spend significantly more on external analysis in relation to total net assets than do large cap bank funds and small/mid cap boutique funds.

Explaining pure transaction costs For $y = \frac{txa}{turnover}$ the hypotheses are that banks have better execution in terms of price and that funds that target small/mid cap have higher transaction costs. It is reasonable to assume that a bank can perform better execution through its own brokerage than boutique funds can through a third party. The rationale for believing that small/mid cap targeted funds have more expensive execution is that these trades are presumably smaller in volume and the stocks more illiquid. The price per volume traded would therefore reasonably be higher. The hypotheses to test are:

$$H_0^3\colon\ \beta_b + \beta_{inter} dSM = 0 \qquad H_a^3\colon\ \beta_b + \beta_{inter} dSM < 0$$

$$H_0^4\colon\ \beta_s + \beta_{inter} dBank = 0 \qquad H_a^4\colon\ \beta_s + \beta_{inter} dBank > 0$$

The $\frac{tia}{turnover}$ variable, that is for bundled transaction costs, is regressed only for comparison. The aim is to study it in an exploratory approach as a comparison to the results from testing the hypotheses stated above.

When cost structures have been explained, the aim is to characterize estimated abnormal return with such cost structures for both transaction costs and costs of external analysis.

Explaining abnormal return In the second model put forth in this thesis, the purpose is to explain abnormal return using measures of bundled and unbundled transaction cost structure. We will perform panel regressions on the form,

$$\hat{\alpha}_{it} = \delta_0 + \delta_1 tc_{it} + \delta_2 turnover_{it} + \delta_3 \mathbf{types}_i + \delta_4 \mathbf{yearFE}_t + \epsilon_{it} \tag{2}$$

Here, $\hat{\alpha}_{it}$ is estimated abnormal return and tc_{it} is transaction cost structure. We will let tc_{it} take on first pure transaction costs in relation to total net assets and then the fraction of bundled transaction costs to total net assets. The **types** variables are fund category and firm management type fixed effects.

The hypothesis tested is that higher transaction costs would be associated with worse fund performance—or in other words, that better execution is associated with higher abnormal return. This thesis therefore investigates if it is possible to reject the following null for alternative hypothesis:

$$H_0^5\colon\ \delta_1 = 0 \qquad\qquad H_a^5\colon\ \delta_1 < 0$$

To explain abnormal return using costs of external analysis as regressor, the following model is fit to the data,

$$\hat{\alpha}_{it} = \theta_0 + \theta_1 xc_{it} + \theta_2 idios_i + \theta_3 \mathbf{types}_i + \theta_4 \mathbf{yearFE}_t + \epsilon_{it} \tag{3}$$

In *Equation 3*, xc_{it} is costs of external analysis in relation to total net assets. The model will be fit with and without $idios_i$, idiosyncratic risk. This variable is estimated by $(1 - R^2)$ from a regression with Fama French factors over the entire period 2010–2016 on monthly data. For a motivation to why idiosyncratic risk is estimated this way, see *Section A*. The $\mathbf{types}_i$ variable is $dBank$, dSM and the interaction thereof and are only viable for estimations using between variation.

The hypothesis is that expenditure on external analysis is positively correlated with fund performance, i.e. this thesis investigates if it is possible to reject the following null for alternative hypothesis:

$$H_0^6\colon\ \theta_1 = 0 \qquad\qquad H_a^6\colon\ \theta_1 > 0$$

Choice of variables When explaining cost structures, putting transaction costs in relation to turnover makes sense, in order to measure the average cost of execution. When explaining abnormal return however, it it more reasonable to assume some linear relationship between abnormal return (which is obviously in relation to total net assets) and transaction costs as a fraction of total net assets rather than turnover. The choice of variable for external analysis is a more complex matter. Here, costs in relation to total net assets is used. A discussion can be found in among the results in *Section 4*.

Choice of estimators With panel data, we can use fixed effects, which studies variation within funds, between effects (be), which studies variation between fund averages, or random effects (re), which studies both those variations simultaneously—the assumption being that a change between two funds has the same impact as a change within a fund. As such, *Equation 2* will be estimated using re and *Equation 3* using both fe and be consecutively. For *Equation 1* the variables of interest vary between funds, so be and re will give similar outcomes. Both are used for robustness. We assume a 90% level of confidence in rejecting null hypotheses.

3.2 Estimating Abnormal Return and Idiosyncratic Risk

Daily net asset value per fund share (NAV) and dividend data have been retrieved from the Swedish Investment Fund Association for the period 2010–2016. These data have been converted to weekly and monthly returns with reinvested dividends. Benchmarks have been selected which also include dividends. Carnegie Small-Cap Return Index (Sweden) has been used as benchmark index for funds targeting small/mid cap equity holdings and SIX Portfolio Return Index for other funds. Returns for these indices have been acquired through Carnegie and the Swedish Investment Fund Association respectively. Backward-looking STIBOR with one month maturity has been used as a proxy for the risk-free rate. One month STIBOR experienced negative rates during the latter part of the sample period and the rates have been used in this fashion.

With these data, we estimate abnormal return as a yearly single-factor CAPM over-performance, where the beta in every period has been estimated from a trailing 24 month estimation window. Hence, these abnormal returns have been estimated for 2012–2016. *Figure 1* displays the estimated abnormal returns for all viable fund-years in a histogram.

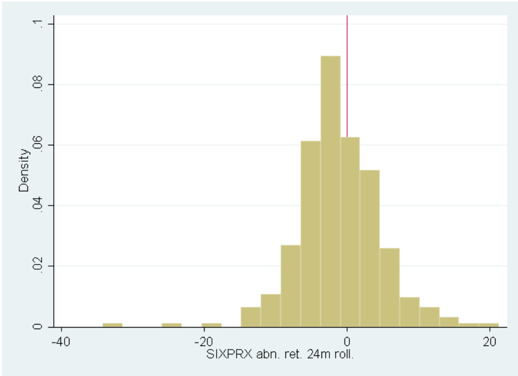

Figure 1: Pooled distribution of estimated abnormal returns for all fund-years.

Furthermore, for robustness and to estimate idiosyncratic risk, we estimate;

- a yearly Jensen's alpha intercept of the excess fund return regressed on the excess benchmark return
- overperformance of normal returns from 36 month rolling beta estimates using Fama French factors and momentum portfolio
- a Jensen's alpha intercept of the excess fund return regressed on the excess benchmark return, Fama French factors and momentum portfolio.

Idiosyncratic risk for every fund i is estimated as $(1 - R_i^2)$ from the latter regression.

The main measurement of abnormal return, from 24 month rolling beta estimations will be referred to as "abnormal return". The other ones will be referred to as "yearly alpha", "36m rolling" and "total alpha" in the respective order put forth above. For a more thorough description of how these estimations are made and why, see *Section A*.

3.3 Potential Selection and Estimation Biases

One obstacle with the data is potential survivorship bias. We have tried to sample funds active during the period regardless of extinction or inception during the period. However, it is possible to argue that survivorship bias is mitigated more the longer the period of study, and since the Swedish market went through unbundling in 2015 one could argue that there is a per se survivorship bias when studying unbundled costs. However, the reality is that this is a new phenomena and novel data. Survivorship bias has been handled in the best way possible in this state of the world.

Furthermore, the data is exposed to two self-selection biases; on the fund and fund-year level. For example, in regards to expenditures on external analysis, funds which are less well-managed or have less ability of analysis may spend more on external analysis to mitigate their disadvantage. Self-selection on the fund-year level could come from possible behaviour among some funds to increase expenditures on external analysts during a year that starts with market under-performance and decrease expenditure during years that start with market over-performance. In both cases, if external analysts do not fully mitigate the gap, one may find a negative correlation between performance and expenditures on external analysts—even if the actual, unobserved causal effect would be positive. In the former case it can be controlled for by studying within-panel variation. This is however *not* possible in the latter case. With that said, this thesis makes no claim to causality.

Our methodology exposes the data to variance in variable bias. Historical data are used to estimate betas—and since the beta estimator has a variance, the abnormal return estimator does as well. When using estimated intercept alphas instead of rolling betas to estimate abnormal returns, these also exhibit a variance in themselves. This variance causes an 'invisible' heteroscedasticity problem. We mitigate visible heteroscedasticity in this study (at least on a consistent basis), but to handle the variance of the estimates, this thesis uses several measures of abnormal return as a robustness check.

Year	Obervation status Has missing values No.	%	No missing values No.	%	Total No.	%
2010	16	21.6%	58	78.4%	74	100.0%
2011	10	13.2%	66	86.8%	76	100.0%
2012	9	11.7%	68	88.3%	77	100.0%
2013	8	10.5%	68	89.5%	76	100.0%
2014	7	9.3%	68	90.7%	75	100.0%
2015	3	4.0%	72	96.0%	75	100.0%
2016	6	8.1%	68	91.9%	74	100.0%
Total	59	11.2%	468	88.8%	527	100.0%

Table 2: Count and percent of missing and non-missing data for funds 2010-2016. The total number of funds differs from 85 due to the inception and extinction of funds during the period. Missing means that any of the collected variables is missing for that fund-year.

3.4 Descriptive Statistics and Data Exploration

Most descriptive statistics are presented in this section. More novel data, however, will be presented with the results in *Section 4*.

Number of observations with missing values for *any* of the collected variables for the 85 funds is reported in *Table 2*. The 7-year time span is in line with some other studies on fund performance, for example Dahlquist et al. (2000) which is based on a 5-year dataset, 1993-1997. It has evidently been increasingly hard to find data further back in time. The panel data is unbalanced due to the conception and extinction of funds during the sample period.

Many variables vary across time and funds, which will be referred to as ‘within’ and ‘between’ variation respectively. Total net assets, derivatives use and all cost variables vary more between funds than within funds, while turnover rate varies fairly two-dimensionally. Abnormal return varies a lot within and idiosyncratic risk only varies between funds. See *Table 4* for detailed descriptive statistics, between and within funds.

Fund management firm type (bulge bracket bank or boutique) and fund

Firm type	Fund category Large Cap No.	 %	 Small / Mid Cap No.	 %	 Total No.	 %
Boutique	32	37.6%	17	20.0%	49	57.6%
Bank	28	32.9%	8	9.4%	36	42.4%
Total	60	70.6%	25	29.4%	85	100.0%

Table 3: Cross-tabulation of firm types and fund categories. For firm type, 'bulge bracket' refers to funds managed by banks that have their own trading and equity analysis departments within the same bank (group) and 'boutique' denotes funds not managed by such firms.

category (small/mid or large cap), vary only between funds. The distribution is tabulated in *Table 3*. There are more than twice as many large cap funds as small/mid cap funds. 36 of the total 85 funds are managed by bulge bracket banks. The smallest fund group, small/mid cap bank funds, contains 8 funds.

A correlation matrix is presented in *Table 5*. Bigger funds, in terms of total net assets, seem to have lower turnover rates and be more likely to be managed by banks. Fund size and the bank dummy both correlate positively with derivatives use and negatively with transaction cost, meaning these funds probably experience better execution in terms of price. For banks, this could be driven by bulge bracket banks having their own brokerage which in turn might enable them cheaper execution. Bank funds also spend more on external research compared to transaction costs.

Small/mid cap targeted funds on the other hand spend comparably less on external analysis than their pure transaction costs and use derivatives to a lower extent—which is associated with less idiosyncratic risk.

None of the variables correlate with abnormal return. First of all, abnormal returns are usually not easily explained. In addition, there are different fund categories and management firm types which might have to be controlled for to capture a more ceteris paribus correlation.

Variable		Mean	Std. dev	Min	Max		
Total net assets [MSEK]		4,209.708	6,099.371	0.102	41,203.000	505	observations
	between		5,501.011	39.308	24,915.857	82	panels
	within		2,184.825	-8,999.149	20,496.851	6.159	periods/panel
Turnover rate [%-units]		81.005	94.083	0.000	1,130.000	438	observations
	between		80.897	12.500	580.400	82	panels
	within		52.586	-219.395	630.605	5.341	periods/panel
Derivatives use (dummy)		0.406	0.492	0.000	1.000	471	observations
	between		0.433	0.000	1.000	82	panels
	within		0.241	-0.452	1.263	5.744	periods/panel
(Re)bundled tr. costs [kSEK]		4,130.507	4,817.252	5.400	24,354.000	469	observations
	between		4,259.535	43.740	14,701.429	82	panels
	within		1,894.272	-3,644.921	15,749.222	5.720	periods/panel
Pure transaction costs [kSEK]		2,810.968	3,096.610	9.000	13,830.000	121	observations
	between		2,961.125	20.000	12,288.000	70	panels
	within		565.458	687.531	4,934.406	1.729	periods/panel
External analysis costs [kSEK]		2,299.472	2,570.124	0.000	10,848.000	121	observations
	between		2,458.395	0.000	10,760.000	70	panels
	within		325.514	790.972	3,807.972	1.729	periods/panel
Ext. analysis/rebundled		0.433	0.187	0.000	0.878	121	observations
	between		0.182	0.000	0.856	70	panels
	within		0.055	0.232	0.635	1.729	periods/panel
(Re)bundled/TNA [%-units]		0.158	0.186	0.014	1.942	399	observations
	between		0.137	0.027	0.686	80	panels
	within		0.129	-0.246	1.738	4.987	periods/panel
Pure tr. costs/TNA [%-units]		0.069	0.058	0.008	0.305	118	observations
	between		0.059	0.009	0.305	69	panels
	within		0.015	0.001	0.137	1.710	periods/panel
Ext. analysis/TNA [%-units]		0.049	0.036	0.000	0.244	118	observations
	between		0.033	0.000	0.193	69	panels
	within		0.015	-0.010	0.109	1.710	periods/panel
(Re)bundl./turnover [%-units]		0.244	0.248	0.011	4.315	366	observations
	between		0.127	0.011	0.874	80	panels
	within		0.217	-0.521	3.685	4.575	periods/panel
Pure tr. costs/turnover [%-units]		0.128	0.075	0.032	0.458	110	observations
	between		0.075	0.032	0.458	69	panels
	within		0.027	-0.012	0.268	1.594	periods/panel
Ext. analysis costs/turnover [%-units]		0.107	0.074	0.000	0.446	110	observations
	between		0.065	0.000	0.313	69	panels
	within		0.031	-0.025	0.239	1.594	periods/panel
Abnormal return [%-units]		-1.144	5.869	-34.248	21.323	334	observations
	between		4.843	-34.248	8.114	76	panels
	within		4.799	-21.232	14.235	4.395	periods/panel
Yearly alpha [%-units]		-0.638	4.236	-20.801	14.321	494	observations
	between		2.346	-8.698	4.785	81	panels
	within		3.756	-15.811	15.275	6.099	periods/panel
36m rolling abn. ret. [%-units]		-0.400	6.921	-23.949	23.198	258	observations
	between		4.660	-13.266	11.917	71	panels
	within		5.579	-22.049	22.679	3.634	periods/panel
Total alpha [%-units]		-1.307	2.271	-10.100	2.799	464	observations
	between		2.459	-10.100	2.799	71	panels
	within		0.000	-1.307	-1.307	6.535	periods/panel
Idiosyncratic risk (1-R2)		0.094	0.068	0.020	0.329	464	observations
	between		0.069	0.020	0.329	71	panels
	within		0.000	0.094	0.094	6.535	periods/panel

Table 4: Descriptive statistics within and between funds. The ‘between standard deviation’ is calculated on fund means to the total mean. The ‘within standard deviation’ is the deviation of all observations to their respective *fund* mean. The between minimum (maximum) show the minimum (maximum) fund mean. The within minimum (maximum) is the most negative (positive) deviation from the respective fund mean—added to the over-all mean for purpose of comparison.

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	**Total net assets**	1												
2.	**Turnover ratio**	-.232*	1											
3.	**Small / Mid cap**	-.139	-.153	1										
4.	**Bulge bracket**	.268*	-.155	-.135	1									
5.	**Derivatives use**	.329**	.108	-.25*	.331**	1								
6.	**Ext. analysis/rebundled**	.144	-.294*	-.235	.488***	.0853	1							
7.	**(Re)bundled/turnover**	-.208	-.116	.248*	-.237*	-.116	-.0778	1						
8.	**Pure tr. costs/turnover**	-.282*	.175	.232	-.373**	-.263*	-.431***	.458***	1					
9.	**(Re)bundled/TNA**	-.297**	.84***	.0152	-.272*	-.0183	-.362**	.288**	.444***	1				
10.	**Pure tr. costs/TNA**	-.285*	.788***	.0183	-.261*	.0156	-.5***	-.066	.242*	.734***	1			
11.	**Ext. analysis/TNA**	-.203	.548***	-.324**	-.161	.0739	.309**	-.0819	-.0437	.497***	.506***	1		
12.	**Abnormal return**	.0476	.0813	.196	-.115	-.12	.0349	.104	.066	.038	-.188	-.141	1	
13.	**Idiosyncratic risk**	-.236	.0501	.531***	-.096	-.289*	-.0982	.177	.134	.167	.00123	-.172	.00653	1

* p<0.05, ** p<0.01, *** p<0.001

Table 5: Correlations between fund averages. Average is taken on values which have been time-demeaned to correct for the unbalanced panel and clear out common trends in the data. Fund categories, firm types and idiosyncratic risk have not been time-demeaned as they are fixed within funds.

4 Results

Unbundling occurred, as said, in 2015. However, only about 3 in 4 funds unbundled their reporting that year. Unbundling was more prevalent among bigger funds. In 2016, almost all funds reported unbundled. In 2015, the ratio of costs of external research to rebundled transaction costs in the whole sample was 45.1% and in 2016 it reached 44.4%. Funds in the sample spent 355 MSEK on transactions and external research in 2016, only 9 MSEK less than the year before. The sampled funds had in 2016 joint total net assets of 434 825 MSEK amounting to 26.3% of the total net asset value of all Sweden-based equity funds. Pure transaction costs and costs for external analysis were hence about 0.08% of total net assets in the sample. See *Table 6* for detailed year-by-year fund averages.

	Means			% unbundled reporting weighted by		
	TNA	Transaction costs			Transaction	Funds
Year	[mSEK]	[kSEK]	% of TNA	TNA	costs	equally
2010	4,180	3,980	0.10%	–	–	–
2011	2,746	4,089	0.15%	–	–	–
2012	3,073	3,228	0.11%	–	–	–
2013	4,041	3,704	0.09%	–	–	–
2014	4,969	4,410	0.09%	–	–	–
2015	5,168	4,649	0.09%	92.69%	87.77%	76.39%
2016	5,947	4,814	0.08%	99.73%	99.16%	97.06%

Table 6: Unbundled reporting and fund averages over years. Only fund-years with non-missing transaction costs included. 'Transaction costs' are either bundled or rebundled.

On average, small/mid cap targeted funds overperformed large cap ones in relation to their benchmark. Boutique funds performed slightly better than did funds managed by bulge bracket banks. However, this result could be driven by correlating factors, such as funds of bulge bracket banks being larger on average. With 24 months rolling single factor beta estimates, which is the main measure of abnormal return used in this thesis, funds in the

	Mean			
	Abnormal	Yearly α	36m rolling	Total α
Fund category				
Large Cap	-1.62%	-0.81%	-1.78%	-1.96%
Small / Mid Cap	0.06%	-0.19%	2.97%	0.45%
Total	-1.14%	-0.64%	-0.40%	-1.31%
Firm type				
Boutique	-0.48%	-0.19%	0.45%	-0.98%
Bulge bracket	-1.94%	-1.17%	-1.44%	-1.68%
Total	-1.14%	-0.64%	-0.40%	-1.31%
Year				
2010		0.49%		-1.53%
2011		-2.98%		-1.53%
2012	-1.38%	-0.09%		-1.53%
2013	-3.42%	-1.56%	-4.54%	-1.28%
2014	-0.16%	-0.04%	-0.31%	-1.20%
2015	-0.04%	0.42%	3.29%	-1.02%
2016	-0.64%	-0.62%	0.10%	-0.97%
Total	-1.14%	-0.64%	-0.40%	-1.31%

Table 7: Measures of abnormal return by year, fund and firm type. 'Rolling' is estimated from a 24 month rolling beta; 'yearly' a yearly Jensen intercept on weekly data, scaled to represent a yearly intercept; '36m rolling' is a over-performance measure with 36m rolling beta estimates of four factors; and 'total' is an intercept on monthly data and four factors for the entire period for every fund scaled to a yearly alpha. The yearly averages of 'total' abnormal return only vary due to inception and extinction of funds. The measurements are more comparable through time than across types of estimates as rolling beta estimates take return-on-return into account in a more feasible way.

sample underperformed by about 1% on a yearly average basis. See *Table 7* for a summary of abnormal return measures over fund categories, firm types and years. The complementary measures will mostly be used for robustness checks. Thus, the seemingly unstable nature of the 36m rolling estimate should not be a major source of concern.

In the sample, 26% of funds over-performed. 43% over-performed pre management fees and 45% pre fees and transaction costs. For funds surviving the whole period, the same numbers were 29%, 50% and 52% respectively.

4.1 Explaining Cost Structures Across Funds

Regression outputs explaining relative cost structures are put forth in *Table 8*. The regressions are estimated using the random effects estimator.

In *Regression 1* we see that large cap funds of banks spend more on research in relation to transactions than do large cap boutique funds. They spend on average 16.2 percent units more. For small/mid cap funds the difference is estimated to about 20.2 percent units even if the difference between the two differences is statistically insignificant. These results could be biased however. For example, funds of banks tend to be bigger in terms of total net assets, and it might be that these results are just driven by funds in some category being, let's say, bigger on average.

Controls in the form of turnover rate, total net assets, the interaction term between the two as well as a dummy of derivatives use are introduced. See *Regression 2*. Here, boutique funds that target small/mid cap equity holdings spend less on external research in relation to transaction costs than do boutique funds without this focus. This difference in cost structure for boutique funds dependent on fund category is interestingly not observed among funds of banks as $\beta_s + \beta_{inter}$ is insignificantly non-zero. These results will give a depth to the models discussed below.

In *Regression 3* a negative difference in analyst expenditure between bank funds and boutiques is only found for large cap funds while a significant negative difference between small/mid caps and large caps is only observed for boutique funds. Another way to look at it is that the only significant difference is that large cap boutique funds spend more on external research than do other types of funds.

We do not know though, if this effect is due to large cap funds of banks using more of their intra-bank research for a per se discount or if their intra-bank research teams give funds connected to banks higher bargaining power with other sell-side research teams. A potential driver for these results could be that funds connected to banks with their own research departments would use *less* research, i.e. that the quantity rather than the price/quantity drives this difference. This idea is not found to be very reasonable as many funds of banks would arguably rely a lot on their equity research departments.

These results are in line with our hypotheses H_a^1 and H_a^2 in favour of which we reject the null hypotheses H_0^1 and H_0^2 respectively.

Difference in expenditure between small/mid cap targeted funds and large cap funds for banks was thought to be ambiguous when defining these hypotheses. The results do not give a clear picture of the significance of $\beta_s + \beta_{inter}$ so the notion of ambiguity is not resolved.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	ext. analysis/rebundled	ext. analysis/rebundled	ext.analysis/TNA	pure trans. costs/turnover	bundled/turnover
Small / Mid cap fund	-0.0895*	-0.114**	-0.0330***	0.0261	0.0661
	(0.0463)	(0.0466)	(0.00927)	(0.0255)	(0.0492)
Bank fund	0.162***	0.141***	-0.0198**	-0.0427**	-0.0251
	(0.0445)	(0.0477)	(0.00859)	(0.0166)	(0.0234)
Bulge × *S/M cap*	0.0401	0.0720	0.0272**	-0.00997	-0.0471
	(0.0875)	(0.0777)	(0.0130)	(0.0308)	(0.0484)
Turnover rate (%-units)		-0.000575	0.000305**	-0.000422**	-0.000338***
		(0.000517)	(0.000154)	(0.000178)	(0.000115)
TNA (MSEK)		1.12e-06	-4.68e-07	-2.17e-06**	-1.23e-06
		(2.63e-06)	(4.52e-07)	(1.02e-06)	(1.91e-06)
Turnover		-7.88e-06*	-1.29e-06	-1.53e-07	-7.75e-06**
		(4.73e-06)	(9.30e-07)	(1.70e-06)	(3.39e-06)
Using derivatives		0.0401	0.0153	0.00137	0.0163
		(0.0495)	(0.0107)	(0.0110)	(0.0282)
Constant	0.383***	0.427***	0.0498***	0.179***	0.330***
	(0.0300)	(0.0518)	(0.0109)	(0.0203)	(0.0706)
Observations	121	114	111	110	366
Number of funds	70	70	69	69	80
Year dummies	Yes	Yes	Yes	Yes	Yes
$\beta_s + \beta_{inter}$	-0.0494	-0.0415	-0.00577	0.0161	0.0191
$\beta_b + \beta_{inter}$	0.202	0.213	0.00746	-0.0527	-0.0722
$\beta_b + \beta_s + \beta_{inter}$	0.113	0.0999	-0.0255	-0.0266	-0.00604
Test $\beta_s + \beta_{inter} = 0$	0.506	0.531	0.554	0.425	0.233
Test $\beta_b + \beta_{inter} = 0$	0.00726	0.00137	0.489	0.0573	0.128
Test $\beta_b + \beta_s + \beta_{inter} = 0$	0.111	0.133	0.0317	0.182	0.793
Test $\beta_b = \beta_s$	1.02e-06	1.42e-06	0.0885	0.0124	0.0735
R2 between	0.279	0.329	0.354	0.286	0.197

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Explaining relative cost structures across funds. These panel regressions capture variation between funds and are more cross-sectional in nature. They use the random effects estimator, but the results are, with very few exceptions robust for estimation with between effects and bootstrapping.

It is not surprising that turnover drives expenditures on external research in relation to total net assets, as an increase by a factor k of turnover would probably be associated with an increase in external research expenditure by a positive factor less than k. Turnover would then presumably have a negative relationship with expenditures on external research as a fraction of turnover. The same regression has been done with a turnover-adjusted regressand instead, confirming this notion. See *Table 11* in *Section B*.

In *Regression 4* in *Table 8* it can be seen that funds connected to banks with their own trading department experience cheaper execution. This is observed for both small/mid cap funds and large cap funds as both β_b and $\beta_b + \beta_{inter}$ are significantly non-zero and negative. It might seem very straight forward to assume that funds of banks with their own trading department would experience cheaper execution, however, there is more to the story than might at first meet the eye. Swedish mutual funds normally report what percentage of their turnover that is executed within the same bank group. Funds of banks in our sample usually report seemingly small numbers for this indicator. Many funds of banks report around 20–30% of volume executed within the same bank group.

So why do funds of bulge bracket banks experience better execution in terms of price? The small number of trades committed through the same bank group could not reasonably explain it. We have controlled for turnover, size and the interaction of the two, so these variables are unlikely driving the results. One could argue that bulge bracket banks have more rigid compliance measures and hence put more resources into actually finding the best, that is cheapest, execution. A perhaps more plausible theory, which is advocated in this thesis, is that bulge bracket banks, due to their intra-bank trading department, get higher bargaining power with other sell-side institutions and hence get a better price for execution over all—despite the low percentage committed within the same bank group.

We successfully reject H_0^3 that there would be no difference in the population between transaction costs of banks and boutiques. It is rejected for both large cap funds ($dSM = 0$) and small/mid cap funds ($dSM = 1$).

H_0^4, that small/mid cap funds have no better nor worse execution fails to be rejected in favour of them having worse execution. Overall, as well as for boutique funds, a simple t-test of difference in population means yields significantly non-zero differences with small/mid cap funds having higher transaction costs per volume. For funds connected to banks, the difference in sample means has the same sign, but the inability to reject that they are equal in the population is probably due to a lack of statistical power. The reason that H_0^4 is not rejected for boutiques in the regression is probably that differences in size and/or turnover rates between funds explain the difference in execution price and not so much that the funds target another equity category. That it is not rejected for bank funds might be a combination of the aforementioned impact of size and turnover controls as well as lack of statistical power.

We have hence seen that for large cap funds, those connected to banks spend less on both external research and have better execution than boutique funds. To connect back to *Regression 2*, it was shown that the same group of funds spend relatively more on external research than transactions. Hence we know that the effect for large cap funds is due to funds connected to banks spending less on external research—but relatively even less than that on transactions compared to boutique funds. In the same fashion, we can see that small/mid cap boutique funds spending less on external research compared to transactions than large cap boutique funds is likely driven by large cap boutique funds spending more on external analysis, not because small/mid cap funds would have higher costs of execution—controlling for size and turnover.

In *Regression 5*, where bundled transaction costs in relation to turned over capital is being regressed on the independent variables of interest along with controls, none of the variables of interest have robust significant coefficients nor are any of the coefficient sums robustly significant. We interpret this as bundled costs containing more noise than do pure transaction costs or expenditures on external research, especially as we have far more observations for bundled transaction costs. It should be more probable to find an effect if the population exhibits the same magnitude for the effect along with the same noise. Another indication that there is more noise when explaining bundled cost structures is the drop in R^2 compared to the previous regressions. The variables of interest remain statistically insignificant when only the years of 2010–2014, the time of bundling, is included for *Regression 5*.

See *Table 11* in *Section B* for these same *Regressions 3-5*, but with the regressands adjusted for estimated turnover rather than total net assets and vice versa. These measures were not found as relevant but have been included in the appendix for the curious reader.

When it comes to the robustness of the results, the primary concern would be that the observations are not randomly selected as we follow the same funds through time. This violates one of the more basic assumptions of linear regression, which we have handled by clustering on the fund-level. Clustering in turn yields consistent heteroscedasticity robust standard errors which can be used without the assumption of homoscedasticity (White, 1980). The significance of our results are not only dependent on correct estimation of standard errors, but also on the assumption that the error terms are normally distributed. We control for this assumption with non-parametric p-values through "bootstrapping". This technique uses the distribution of residuals as a source to in essence simulate, with random draws from the sample, p-values which do not rely on the assumption of normally distributed error terms. In the vast majority of attempts we have performed, the bootstrapping process for any of the regressions yields at least 90% significance in harmony with the results already discussed. The only exception being the coefficient of the small/mid cap dummy in *Regression 1* which jumps to a p-value of around 20% when bootstrapping with between effects. The same variable in *Regression 2* is robust.

The random effects estimator has been used since it is more conventional. The variation of interest however is comparing types of funds to each other—i.e. between variation—so regressions with the between effects estimator has been done as well. This gives significance in harmony with the results already discussed—even when bootstrapping. For *Regression 5* however, signs of coefficient sums and significance levels are quite volatile, but we have already drawn the conclusion that the bundled cost structure is very unpredictable with the variables we use.

4.2 Explaining Abnormal Return with Cost Structures

In this section we examine the extent to which cost structures characterize funds in terms of their abnormal return. This section begins to look at pure transaction costs (that is, transaction costs excluding costs for external analysis) as well as bundled transaction costs. They are followed by costs for external analysis.

4.2.1 Bundled and Unbundled Transaction Costs

We take the approach of looking at within and between variation simultaneously with the random effects estimator. This means that we assume that higher transaction costs have the same impact within a fund from year to year as it does between funds.

Our hypothesis is that funds with better execution in terms of price, i.e. less expensive execution, will perform better on average. This, along with the idea of looking at both variations simultaneously, is intuitive if execution is regarded a commodity—which does not have to be the case. With execution being a commodity we mean that it is a perfectly exchangeable good in the sense that the price is all that matters to get "best execution". Management may increase spending on transactions in relation to total net assets during a year where management finds many attractive investments, while the investments—if they are truly attractive—may drive abnormal return. This could capture an undesired correlation. Turnover rate is therefore added as a control.

The results are shown in *Table 9* in *Regression 1.* On average, in the sample, 1 basis point increase in transaction costs per net total assets is associated with abnormal returns of 0.255%-units less. Since characteristics of funds are studied, this number does make sense. However, one would expect a decrease in abnormal return to be as big as the increase in transaction costs per total net assets, holding all else equal. It is therefore evident that there are other things at play.

One theory is that management which is sloppy with the transaction costs are also sloppy with other matters regarding the management of the fund. This would mean that we have captured an indicator that correlates with other factors associated with under-performance.

Another theory is that we have captured some "fire sale effects". Controlling for turnover rate makes sense, as the transaction costs which are not explained by the average price for turnover in the economy would be regarded as better or worse execution if the costs are respectively lower or higher than this average. With that said, imagine management realizes that they have a "rotten" equity holding that they need to get rid of. Imagine again that they want to get rid of it to "any price of execution". This would mean that transaction costs are possibly increased slightly, while it is possible that not only the increased transaction costs, but the existence of a rotten equity holding damages the abnormal return of the fund. The rather large coefficient would have captured these effects as well, not only those of the direct impact of the transaction costs on the abnormal return.

In addition, as turnover has been added as a control, the interpretation of the result could arguably take on a different economic interpretation. Variation in transaction costs which cannot be explained by turnover is in essence used to explain abnormal return. Hence it could be argued that the interpretation of the coefficient is *overpriced* pure transaction costs rather than pure transaction costs in and by themselves.

With this in mind, this thesis studies characteristics of funds, and as such, better-performing funds are characterized by lower transaction costs.

We can hence reject the null hypothesis H_0^5 that the coefficient of the fraction of pure transaction costs to estimated turnover in explaining abnormal return would be zero. We reject it in favor of the alternative hypothesis that it is negative, H_a^5. We interpret these results as funds in our sample that experience better execution in terms of price, also perform better on average, though it should be noted that this relationship depends on other things than just the cost of execution itself.

It is possible that more expensive trading departments do bring value to funds higher than the difference in cost—i.e. that execution is not a commodity. However, if there is such an effect, this analysis has not been able to capture it on average.

These results are reached with heteroscedasticity-robust standard errors and are robust for other estimations of abnormal return. In *Table 12* in *Section C*, we explain a yearly Jensen's alpha and an alpha from 36 months rolling betas with Fama French factors and momentum portfolio. The results remain significant.

VARIABLES	(1) Abnormal return	(2) Abnormal return	(3) Abnormal return	(4) Abnormal return	(5) Abnormal return
Pure tr. cost/TNA	-25.50*				
	(13.30)				
Bundled/TNA		-0.155			
		(4.814)			
Ex. analysis/TNA			3.873	-0.00861	8.374
			(27.84)	(17.22)	(17.87)
Turnover rate	0.00757	-0.00222			
	(0.0149)	(0.0101)			
Idiosyncratic risk (1-R2)					18.26*
					(9.418)
Constant	1.834	-0.238	-1.342	-1.193	-2.111
	(1.628)	(0.796)	(1.668)	(2.050)	(2.073)
Observations	104	278	111	111	104
R-squared			0.000	0.025	0.098
Number of funds	65	74	65	65	60
Estimator	re	re	fe	be	be
Year FE	Yes	Yes	Yes	Yes	Yes
Bank × Fund type FE	Yes	Yes	No	Yes	Yes
Fund-level clusters	Yes	Yes	Yes	-	-
R-squared between	0.0847	0.148	0.00562	0.0245	0.0979

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 9: Explaining abnormal return with cost structure

For bundled transaction costs in *Regression 2* we get smaller and insignificant coefficients and for all abnormal return estimates tested (see *Table 12* in *Section C* for the other estimates). Restricting the period of study to 2010–2014 does not yield any significance.

We conclude that there is likely more noise in bundled transaction costs than in pure transaction costs, the increase in R^2 probably driven by the fixed effects year dummies.

However, that bundled transaction costs have a negative correlation with fund performance in Sweden could be supported by Dahlquist et al. (2000), a study on 1993-1997 data.

We cannot reject H_0^5 for bundled transaction costs.

The R^2 is fairly low for these regressions. However, bear in mind that we are explaining residuals to the CAPM or a multi-factor model. By theory and empirical research, these residuals are not to be easily explained. Despite this, we suggest that pure transaction costs seem to be a better predictor of fund performance than are bundled transaction costs.

4.2.2 Costs of external analysis

Regressions 3-4 in *Table 9* show no significance in explaining abnormal return with expenditures on external analysis—neither within funds nor between. This tendency is consistent with other abnormal return estimates, neither for within nor for between estimations, as seen in *Table 12* in *Section C*. Using a random effects estimator would probably not make sense, as argued earlier, however, for the sake of comparability with the results for pure transaction costs, a random effects estimation did not yield any significance either.

With this said, finding a fair measurement for costs of external analysis is quite a tricky matter. From an information value perspective one could argue that a function with decreasing marginal return of the expenditures would be a suitable approach. After all, presumably, the information received is the same no matter the size of the fund. This might discredit the information acquisition of bigger funds as they spend more on average. Costs of external analysis could then explain variation in abnormal return that would have been explained by fund size. On the other hand putting costs of external analysis in relation to total net assets might give little information of how informed the trading activity in the fund is in regards to external analysis. This could call for a measurement put in relation to estimated turnover.

The problem with putting costs of external analysis in relation to estimated turnover, though, is that the measurement, instead of capturing how informed the trading activity is, could capture how poorly fund management follows the research they pay for. Two funds that pay the same amount for the same research would yield a higher cost of external analysis in regards to turnover for the fund that does not act on the research, i.e. actually commits trades as a result.

To characterize funds overall with expenditures on external research, the simple answer might be that there is no relation—at least that a strong evidence for such a relationship cannot be found with these data. However, if the intention is to explain abnormal return by expenditures on external research as an evaluation instrument of the value of sell-side research, one obvious omitted variable in the regression is how well fund management listens to and follows sell-side analysts' research. Without this variable, it is hard to estimate if sell-side research does indeed bring value to funds. We find it clear that this omitted variable is unobserved. With that said, we suggest a proxy variable for listening to or following *some* source, if it be in-house research, management intuition, gambling, sell-side research, wisdom or something else. This proxy is active share, or idiosyncratic risk to simplify things even more.

We make the assumption, and we invite the reader to argue against it, that the only way for a fund charged with fees and other expenditures to (on average) beat a cost-less index is to deviate from it, that is; to correlate less with the index. It is important to understand that in extreme theoretical situations where the efficient market hypothesis does not hold, this is not necessarily the case. We do find the idea appealing for empirical research though. After all, the idea of sell-side research could be simplified to inviting clients to take on idiosyncratic risk from stocks that are more likely to over-perform to a degree that compensates for the increased risk.

If one accepts this premise, one would naturally wonder; do funds that pay more for external research correlate less or more with the market? And how do funds which correlate more or less with the market perform?

When asking those same questions to the data, an intriguing result pops out. It turns out that funds which beat the market correlate less with the market on average, funds which spend more on external analysis (as just shown) perform insignificantly worse on average and many funds which spend the most on external research correlate well above the median with the market. *Figure 2* shows these relationships without adjusting for fund and firm type fixed effects.

We use a proxy for idiosyncratic risk, i.e. deviation from the market, estimated by $(1 - R^2)$ from a multi-factor Jensen's alpha estimate for the entire period 2010–2016. The reason we estimate idiosyncratic risk over the entire period is that it mitigates noise in the measurement. Fama French factors and momentum portfolio is included in the regression to make sure that funds with slightly passive exposure to some factor are not seen as more active then they might actually be. When controlling for this idiosyncratic risk measure in *Regression 5* in *Table 9*, the estimated coefficient for costs of external analysis in relation to total net assets is estimated to be positive, though, by all means insignificant.

Even if the null hypothesis H_0^6, that the coefficient of external research expenditure is zero, fails to be rejected in favour of it being positive, these findings shed light on the difficulties of using expenditures on external research as an evaluation tool of the value of sell-side research.

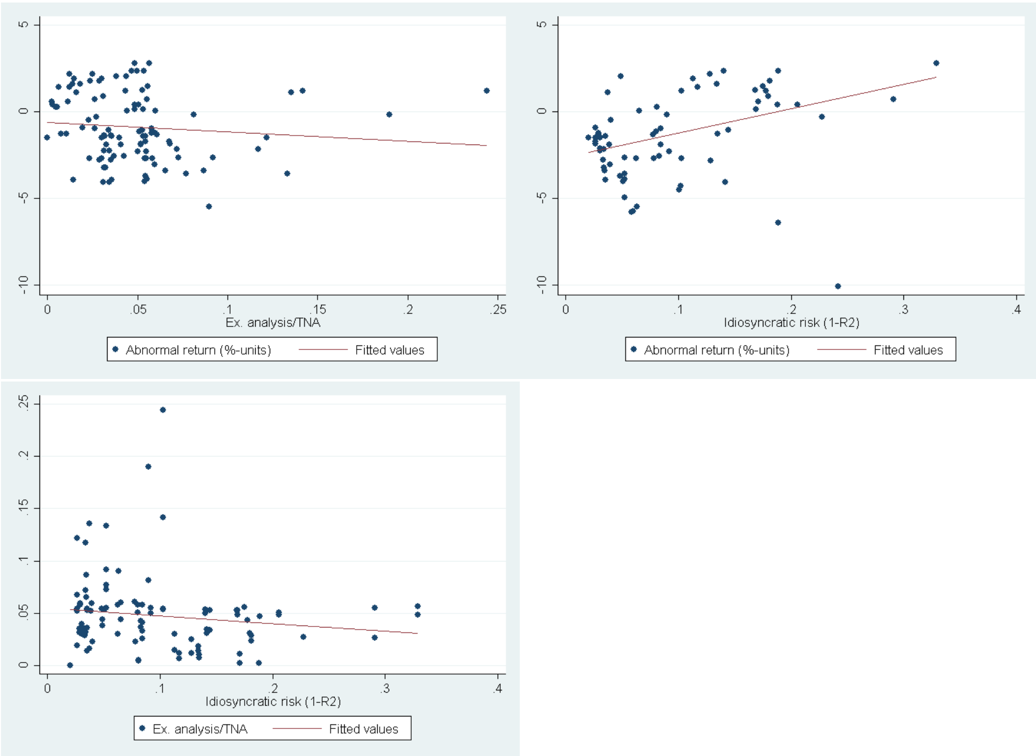

Figure 2: Abnormal return, idiosyncratic risk and expenditures on external research. The first graph plots abnormal return dependent on external analysis. The second graph plots abnormal return dependent on estimated idiosyncratic risk. The third graph plots expenditure on external analysis dependent on idiosyncratic risk. The plots are not adjusted for fixed effects.

With that said, one idea to inspire future research with goes back to the the discussion on self-selection bias on the fund level in *Section 3*. It could be that fund managers who are less skilled than other fund managers first of all make sure to mimic the benchmark index more fully and also to reach out to external analysts to a greater extent in an attempt to mitigate the skill gap. If there is a causal relationship between expenditure on external analysts, all else equal, and fund performance—for funds actually executing on research they pay for—this could be smeared out in the data by fund managers who do not execute on what they pay for or in differences in in-house research density or management skill.

Another, perhaps more romantic theory, is that the highest spenders on external research are risk averse. If closer mimicking of the market portfolio *and* interactions with external analysts are regarded “safe havens” by fund managers, then more risk-averse fund managers might both mimic the market to a greater extent *and* spend more on external research. The relationship might therefore only be a mechanic result caused by differing risk appreciations among fund managers. We find this theory more plausible than the previous one, even if it by no means explains the entire puzzle of expenditures on external research.

4.2.3 A Potential Remedy for the External Research Puzzle

This section takes an exploratory approach to dig deeper into theory, data and the expenditures on external research among Swedish actively managed mutual funds.

Allegorically speaking, it is quite crowded close to the market portfolio in this sample, i.e. many funds have taken on very little idiosyncratic risk (again, see *Figure 2*). As such, there is probably not enough statistical power to cut off the main body of funds and analyze characteristics of external research and abnormal return for funds that deviate more from the market.

Therefore, an approach that uses all or a lot of the variation in the dataset will have to be undertaken. The issue to investigate is that some high spenders are suspected not to vary from the market enough for sell-side research to actually pay off. We assume that the relationship between expenditure on external analysis and abnormal return is that it is nothing but a cost for funds that take on no idiosyncratic risk and as such has negative correlation with abnormal return for such funds. However, for funds deviating more from the market, external research expenditure could exhibit a positive correlation with abnormal return.

To test if the slope of external research costs when explaining abnormal return increases, i.e. becomes more positive, with increased levels of idiosyncratic risk, the following model will be used;

$$\hat{\alpha} = \lambda_{xc} xc + \lambda_{inter} idios \times xc + \lambda_F \mathbf{F} + \lambda_0 + \epsilon \tag{4}$$

where $\hat{\alpha}$ is an abnormal return estimate, for which 'total' alpha will be used; λ_{inter} captures the change in return to expenditures on external research with increased idiosyncratic risk; and $\mathbf{F}$ are control variables in the form of idiosyncratic risk, fund and firm type dummies as well as year dummies to allow for fixed effects. This model is derived in *Section D* in the appendix.

The hypotheses to be tested are;

H_0^7: $\lambda_{inter} = 0$ H_a^7: $\lambda_{inter} > 0$

	(1)
VARIABLES	Total alpha (%-units)
Idiosyncratic risk (1-R2)	2.033
	(8.270)
Ex. analysis/TNA	-24.59
	(15.00)
Idiosyncratic risk × ext. analysis/TNA	302.9*
	(162.2)
Constant	-0.0400
	(1.096)
Observations	105
Number of funds	61
R-squared	0.457
Estimator	be
Year FE	Yes
Bank × Fund type FE	Yes
Fund-level clusters	-

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Regression output explaining abnormal return with external research expenditures at different levels of idiosyncratic risk

Table 10 displays the results from regressing this model. The sign of the coefficient of the fraction of external analysis to total net assets is the return of the variable where idiosyncratic risk is zero. As expected it is negative, though not statistically significant. The coefficient of interest, λ_{inter} is significantly non-zero and positive, meaning that funds which spend more on external research seem to have more positive of a difference in abnormal return than other funds with the same idiosyncratic risk, the more idiosyncratic risk funds have taken on.

We reject H_0^7 in favor of H_a^7, that the return of expenditure on external analysis increases with idiosyncratic risk.

In theory, under this model, the return to external analysis in this sample is estimated to be on average positive when *idios* exceeds such a number that,

$$\frac{\partial(\hat{\hat{\alpha}}|\mathbf{F})}{\partial xc} > 0 \Rightarrow idios > -\frac{\lambda_{xc}}{\lambda_{inter}} \approx \frac{24.59}{302.9} \approx 0.081 \tag{5}$$

The interpretation of the number above is that the return of expenditures on external research to abnormal return between funds in the sample is on average positive as idiosyncratic risk exceeds roughly 8%. This number probably has a load of standard error associated with it which we bluntly ignore. It also depends on linearity. The idea that in the population every point of increase in $(1 - R^2)$ would be associated with an equal increase to the slope of expenditures on external research to abnormal return, for any level of idiosyncratic risk, is not reasonable. With that said, it is sometimes better with a simple model and know of its shortcomings than a complex model that might exhibit a better fit with the data. This is a very theoretical and simplified approach to empirical and complex problems. The exercise in *Equation 5* showcases the model but is far from either a robust result or a useful metric.

The significance of the coefficient of the interaction term of idiosyncratic risk and external analysis expenditures to total net assets is of interest though, and is robust for bootstrapping.

These results are by no means suggested to be causal—that a fund that takes on more idiosyncratic risk would hence get a greater return from expenditures on external analysis. The purpose is to characterize funds in regards to abnormal return and expenditure on external research. These results suggest that higher spenders on external research in our sample overperform funds with the same idiosyncratic risk more the higher the level of idiosyncratic risk.

Since an exploratory approach has been taken on to shed light on the puzzle of costs of external research, a type I error has, from what we can judge, been more probable than significance levels may tell. Also, there are quite a few assumptions on the way—many of which are debatable. As such, we consider the finding that more idiosyncratic funds have higher return to expenditures on external analysis to be suggestive in nature, and in no wise a full explanation of the external research puzzle. It is left up to the reader to judge how reasonable the assumptions and theory are.

5 Discussion

This thesis finds that bank-owned funds experience better execution in terms of price. This is linked to a higher bargaining power due to the access to brokerage within the bank rather than to the intra-bank brokerage itself.

Higher costs of transactions are correlated with under-performance. We suggest that unbundled transaction costs are better predictors of under-performance than are bundled transaction costs, which have already been studied by among others Dahlquist et al. (2000). The idea in MiFID II, that funds should pursue "best execution" might therefore be in the best interest of the fund share holders—at least when quantifying "best execution" in terms of price.

This thesis finds that the biggest spenders on external research are large cap funds that are not managed by banks. This could in part be explained by more dependence on in-house research by small and mid cap funds as well as access to intra-bank research among bank-owned funds. This is of interest to sell-side institutions in pre-unbundling economies that may evaluate to cover smaller equities for a more diverse post-unbundling clientele.

We find no relation between abnormal return and expenditures on external research—which seems in harmony with the notion of information acquisition in at least semi-strong efficient markets advocated by among others Fama (1991), Sharpe (1964) and Carhart (1997). This only means, however, that in the data at hand, it is not possible to characterize funds in terms of abnormal return and expenditures on external research. The metric is exposed to, among other things, self-selection by fund managers and is a complex instrument for evaluating the value of sell-side research overall—something this thesis does not claim to have achieved. This also suggests that it would be hard for fund managers to use other funds' expenditures as an indicator for their own optimal cost structure.

A puzzling find is that the highest spenders on external research correlate strongly with the market, and that over-performing funds have a tendency of less correlation with the market. We find suggestive evidence that the return of expenditures on external research between funds becomes more positive for funds taking on more idiosyncratic risk.

This research only covers characteristics of Swedish active mutual funds investing only in Sweden in the wake of unbundled transaction costs. There is no claim to causality of such characteristics. It is reasonable to assume that active mutual funds in other locations similar to Sweden will exhibit similar characteristics as those found in this thesis, though this is something left to future research to investigate.

The findings in this thesis suggests that MiFID II regulations—in regards to unbundled transaction costs within the active mutual fund industry—might create greater transparency and information to fund share holders. What funds and sell-side institutions that stand to win or lose from MiFID II has not been investigated and is also left to future research. One hypothesis to test is whether funds exposed to small/mid cap equities are "winners" from the new regulations just as sell-side institutions with more exposure to large cap funds as "winners".

The biggest questions that have arisen from this research, which is being left up to future studies of post-unbundling economies is (i) to investigate why high spenders on external research correlate so well with the market and if this pattern is consistent; (ii) to investigate the return to expenditures on external research in relation to active share or idiosyncratic risk; (iii) to perform event studies identifying winners and losers among buy-side and sell-side institutions; (iv) to study differences in cost structures for different types of funds within and across countries; and (v) to use within-panel variation over more years or introduce instrument variables to attempt to capture the causal impact of external research expenditures on abnormal return.

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A Estimating Abnormal Returns and Idiosyncratic Risk

Daily net asset value per fund share (NAV) and dividend data have been retrieved from the Swedish Investment Fund Association for the period 2010–2016. These data have been converted to weekly and monthly returns with reinvested dividends. Benchmarks have been selected which also include dividends. Carnegie Small-Cap Return Index (Sweden) has been used as benchmark index for funds targeting small/mid cap equity holdings and SIX Portfolio Return Index for other funds. Returns for these indices have been acquired through Carnegie and the Swedish Investment Fund Association respectively. Backward-looking STIBOR with one month maturity has been used as a proxy for the risk-free rate. One month STIBOR experienced negative rates during the latter part of the sample period and the rates have been used in this fashion.

With these data, we estimate abnormal return as a yearly single-factor CAPM over-performance, where the beta in every period has been estimated from a trailing 24 month estimation window. Hence, these abnormal returns have been estimated for 2012–2016.

Put in equations,

The $\hat{\beta}_{it}$ estimate for every fund i in every feasible period t is retrieved through a fit of the model $R_{fund;i\tau} = \beta_{it} R_{benchmark;i\tau} + \beta_0$ where $t-24 \leq \tau \leq t-1$, $R_{fund;i\tau}$ is excess return of the fund and $R_{benchmark;i\tau}$ excess return of the benchmark index.

Normal return is then calculated on a monthly basis as $nr_{it} = STIBOR_t + \hat{\beta}_{it} R_{benchmark;it}$ and aggregated on a yearly basis for period t_0 as

$$yearly\ nr_{it_0} = \left(\prod_{t=t_0-11}^{t_0} 1 + nr_{it} \right) - 1 = \exp \left(\sum_{t=t_0-11}^{t_0} ln(1 + nr_{it}) \right) - 1 \quad (6)$$

Abnormal return for a year is then estimated as the difference between yearly fund return and yearly normal return and reported in percent units. Histogram over the distribution of estimated abnormal returns in the sample is displayed in *Figure 1*.

For the sake of robustness, we also estimate abnormal return as the intercept of the excess fund return during a year and the excess benchmark return (Jensen, 1968) with weekly data. The following model is run for every fund i over all weeks τ during a year t:

$$R_{fund;i\tau} = \alpha_{it} + \beta_{it} R_{benchmark;i\tau} + \epsilon \quad (7)$$

The abnormal return estimates, $\hat{\alpha}_{it}$, are calculated, where possible, for 2010–2016. Since $\hat{\alpha}_{it}$ is for weekly data it is scaled by number of trading weeks, which due to return-on-return does not make it comparable to other yearly measurements of abnormal return, however, makes it easier to handle. It is however comparable with abnormal returns estimated in the same way.

Furthermore, we use the following model to estimate abnormal return in two additional ways:

$$R_{fund;i\tau} = \alpha_i + \beta_i R_{mrkt;i\tau} + \gamma_i R_{HML;i\tau} + \delta_i R_{SMB;i\tau} + \theta_i R_{WML;i\tau} + \epsilon_{it} \quad (8)$$

where $R_{mrkt;\tau}$ is the return of the SIX Portfolio Return Index less STIBOR for the month τ. HML, SMB and WML are self-financing portfolios from Kenneth French; high-minus-low, small-minus-big and winners-minus-losers (i.e. momentum) portfolios respectively.

The first estimation is a 36 month rolling estimation. The $\hat{\beta}_{it}$, $\hat{\gamma}_{it}$, $\hat{\delta}_{it}$ and $\hat{\theta}_{it}$ estimates for every fund i in every feasible month t is retrieved through a fit of the model where $t - 36 \leq \tau \leq t - 1$. Normal returns are estimated on a monthly basis as,

$$nr_{it} = STIBOR_t + \hat{\beta}_{it} R_{mrkt;it} + \hat{\gamma}_{it} R_{HML;it} + \hat{\delta}_{it} R_{SMB;it} + \hat{\theta}_{it} R_{WML;it} \quad (9)$$

and aggregated to yearly abnormal returns as described in *Equation 6*.

We also estimate an alpha intercept with monthly data where the portfolio coefficients of every fund are estimated as constants over the whole period 2010-2016. For all months τ, during 2010–2016 or the life of the fund, we regress *Equation 8*. This abnormal return estimate, $\hat{\alpha}_i$, is scaled by a factor of 12 since it is estimated with monthly data.

From the regression in *Equation 8*, idiosyncratic risk is estimated as $(1 - R_i^2)$ for every fund i. The reason idiosyncratic risk is estimated using Fama French factors and during the whole period is to minimize the noise in estimating idiosyncratic risk.

For the Fama French factors we have used European data. Even if this is not exactly optimal when studying Swedish mutual funds, these measurements of abnormal return are only used as a means of robustness check, unless used in conjunction with idiosyncratic risk. It is found to be feasible, however, to use Fama French factors in estimating idiosyncratic risk as funds with, let's say a somewhat passive momentum strategy in a part of the portfolio, should not be seen as more active than they really are.

The main measurement of abnormal return, from 24 month rolling beta estimations will be referred to as "abnormal return". The other ones will be referred to as “yearly alpha”, “36m rolling” and “total alpha” in the respective order put forth above.

B Other Cost Structure Regressands

Table 11 shows the results of the same regressions as in the *Regressions 3-5* in *Section 4.1*, but turnover has been swapped for total net assets and vice versa for the regressands.

VARIABLES	(1) ext.analysis/turnover	(2) pure trans. costs/TNA	(3) bundled/TNA
Small / Mid cap fund	-0.0395**	-0.00147	0.0367
	(0.0159)	(0.0121)	(0.0281)
Bulge bracket	0.0274	-0.0250**	-0.0274*
	(0.0179)	(0.0100)	(0.0151)
Bulge × S/M cap	0.0304	0.0180	-0.0117
	(0.0257)	(0.0168)	(0.0305)
Turnover rate (%-units)	-0.000592***	0.00103***	0.00175***
	(0.000160)	(0.000137)	(0.000204)
TNA (MSEK)	-9.92e-08	3.47e-07	4.87e-07
	(1.34e-06)	(4.36e-07)	(1.45e-06)
Turnover	-4.74e-06**	-3.11e-06***	-4.66e-06
	(1.90e-06)	(1.00e-06)	(3.16e-06)
Using derivatives	0.0182	0.00295	0.00362
	(0.0163)	(0.00572)	(0.0146)
Constant	0.150***	0.0262***	0.0856**
	(0.0175)	(0.00992)	(0.0355)
Observations	110	111	367
Number of funds	69	69	80
Year dummies	Yes	Yes	Yes
$\beta_s + \beta_{inter}$	-0.00909	0.0166	0.0250
$\beta_b + \beta_{inter}$	0.0578	-0.00692	-0.0391
$\beta_b + \beta_s + \beta_{inter}$	0.0183	-0.00840	-0.00235
Test $\beta_s + \beta_{inter} = 0$	0.680	0.142	0.0326
Test $\beta_b + \beta_{inter} = 0$	0.00483	0.601	0.152
Test $\beta_b + \beta_s + \beta_{inter} = 0$	0.332	0.482	0.870
Test $\beta_b = \beta_s$	0.00201	0.0353	0.0204
R2 between	0.362	0.693	0.622

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Explaining relative cost structures across funds in relation to turnover or total net assets. These panel regressions capture variation between funds and are more cross-sectional in nature. The results, except for *Regression 3* are robust for the between effects estimator.

C Explaining Abnormal Return

VARIABLES	(1) Yearly alpha intercept	(2) Abnormal return 36m FF	(3) Yearly alpha intercept	(4) Abnormal return 36m FF	(5) Yearly alpha intercept	(6) Yearly alpha intercept	(7) Abnormal return 36m FF	(8) Abnormal return 36m FF
Pure tr. cost/TNA	-17.13*	-22.94*						
	(10.27)	(13.31)						
Bundled/TNA			0.354	-4.912				
			(1.564)	(4.693)				
Ex. analysis/TNA					16.22	6.713	-2.743	-1.097
					(21.56)	(15.06)	(22.15)	(15.25)
Turnover rate	0.00295	0.0157	-0.000505	0.00860				
	(0.0108)	(0.0183)	(0.00439)	(0.0115)				
Constant	2.400*	3.023**	-2.278***	-4.338***	-1.120	-0.538	2.091	2.981
	(1.318)	(1.399)	(0.725)	(1.481)	(1.310)	(1.751)	(1.431)	(1.785)
Observations	109	102	350	219	116	116	109	109
R-squared					0.020	0.084	0.044	0.394
Number of funds	68	63	77	70	68	68	63	63
Estimator	re	re	re	re	fe	be	fe	be
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank * Fund type FE	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Fund-level clusters	Yes	Yes	Yes	Yes	Yes	-	Yes	-
R-squared between	0.145	0.249	0.161	0.323	0.0150	0.0837	0.111	0.394

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Robustness of abnormal returns explained by transaction costs and costs of external research

D Derivation of Model to Test Increased Coefficient of External Research Costs to Abnormal Return with Increased Idiosyncratic Risk

Let say ther is an abnormal return estimate, $\hat{\alpha}$, which for simplicity is regarded to be unbiased. This abnormal return estimate has an average or expectation of $\hat{\hat{\alpha}}$ that is a function of some variables. The hypothesis is that, keeping some variables $\mathbf{F}$ fixed, the change in $\hat{\hat{\alpha}}$ in regards to xc would be negative when *idios* is very close to zero, but become more positive as *idios* becomes larger. In other words, assuming linearity, we can express the return of xc to $\hat{\hat{\alpha}}$ holding $\mathbf{F}$ fixed as,

$$\frac{\partial(\hat{\hat{\alpha}}|\mathbf{F})}{\partial xc} = \lambda_{xc} + \lambda_{inter} \times idios \tag{10}$$

where λ_{xc} is the return of xc to $\hat{\hat{\alpha}}$ keeping $\mathbf{F}$ constant and *idios* being 0. We expect λ_{xc} to be negative given how we have argued around the data, however this is not the coefficient of greatest interest. The hypothesis is that the return of external research to abnormal return becomes closer to or more positive the greater *idios* is. Hence, the hypotheses to be tested (referred to as H_0^7 and H_a^7 in the main text) is;

H_0^8: remedy $\qquad$ H_a^8: $\lambda_{inter} = 0$ $\qquad$ $\lambda_{inter} > 0$

To test this alternative hypothesis, we first take the integral,

$$(\hat{\hat{\alpha}}|\mathbf{F}) = \int \frac{\partial(\hat{\hat{\alpha}}|\mathbf{F})}{\partial xc} \partial xc = \lambda_{xc} \times xc + \lambda_{inter} \times idios \times xc + \lambda_0 \tag{11}$$

and then under the assumption of linearity and the expected value of the unexplained in the population model to be zero given all model variables, the variables to keep fixed are moved into the model,

$$\hat{\alpha} = \lambda_{xc} xc + \lambda_{inter} idios \times xc + \lambda_F \mathbf{F} + \lambda_0 + \epsilon \tag{12}$$

where λ_0 is the intercept and ϵ is the error term.

What variables should be kept constant? Seeing that we have found differences in abnormal return and cost structures between funds with different management firm type as well as fund categories we will introduce bank and small/mid cap dummies along with their interaction term. Also, in the premise to the hypothesis test, idiosyncratic risk was to be held constant. These four controls will be introduced along with year dummies.

When choosing an abnormal return measure one would have to consider at minimum (i) the connection to the idiosyncratic risk estimation, (ii) the time period of the estimate and (iii) the rigidity of the measure. This regression will be done with the 'total' alpha, meaning a Jensen's alpha estimate with four factors over the years 2010–2016. This ensures rigidity and also matches the idiosyncratic risk measure as it has been retrieved through the same regression. One underlying assumption is that the last two years' cost structure regarding expenditures on external analysis is informative for abnormal return during the entire period. This could be debated.

As idiosyncratic risk and the 'total' alpha are fixed within funds, the regression will be estimated using between variation.

Note: The *it*-subscripts have been omitted in the derivation to show the concept of the model rather than being caught up in the panel regression framework.

E Funds in the Sample

Management firm name	Fund name	Years	Return data [Y/N]
AMF Fonder	AMF Aktiefond Småbolag	2010–2016	Yes
AMF Fonder	AMF Aktiefond Sverige	2010–2016	Yes
Aktie-Ansvar AB	Aktie-Ansvar Sverige	2010–2016	Yes
Alfred Berg Fonder AB	Alfred Berg Hållbar Tillväxt Sverige A	2016–2016	No
Alfred Berg Fonder AB	Alfred Berg Sverige Plus A	2010–2016	Yes
Carnegie Fonder AB	Carnegie Sverigefond	2010–2016	Yes
Catella Fondförvaltning AB	Catella Reavinstfond	2010–2016	Yes
Catella Fondförvaltning AB	Catella Småbolag	2010–2016	Yes
Cicero Fonder AB	Cicero Focus A	2010–2016	Yes
Cicero Fonder AB	Cicero SRI Sverige	2010–2016	Yes
Cliens Kapitalförvaltning AB	Cliens Sverige A	2010–2016	Yes
Cliens Kapitalförvaltning AB	Cliens Sverige Fokus A	2011–2016	Yes
Danske Capital AB	Danske Invest Sverige	2010–2016	Yes
Danske Capital AB	Danske Invest Sverige Fokus	2010–2016	Yes
Didner & Gerge Fonder AB	Didner & Gerge Aktiefond	2010–2016	Yes
Eligo Asset Management AB	Viking Fonder Sverige A	2015–2016	No
Enter Fonder AB	Enter Select	2010–2016	Yes

Continuing...

Management firm name	Fund name	Years	Return data [Y/N]
Enter Fonder AB	Enter Select Pro	2010–2016	Yes
Enter Fonder AB	Enter Småbolagsfond A	2015–2016	No
Enter Fonder AB	Enter Sverige	2010–2016	Yes
Enter Fonder AB	Enter Sverige Pro	2010–2016	Yes
Folksams Aktiefond Sverige	Swedbank Robur	2010–2014	Yes
Folksams Tjänstmannafond Sverige	Swedbank Robur	2010–2014	Yes
Granit Fonder AB	Granit Småbolag	2010–2016	Yes
Granit Sverige 130/30	Granit Fonder	2010–2014	Yes
Gustavia Kapitalförvaltning AB	Gustavia Småbolag	2010–2016	Yes
Gustavia Kapitalförvaltning AB	Gustavia Sverige SEK	2010–2016	Yes
Handelsbanken Bofondförvaltning AB	Handelsbanken Bostadsrätterna	2010–2016	Yes
Handelsbanken Fonder AB	Handelsbanken AstraZeneca Allemans	2010–2016	Yes
Handelsbanken Fonder AB	Handelsbanken Svenska Småbolag	2010–2016	Yes
Handelsbanken Fonder AB	Handelsbanken Sverige Selektiv (A1) SEK	2014–2016	No
Handelsbanken Fonder AB	Handelsbanken Sverigefond	2010–2016	Yes
Lannebo Fonder	Lannebo Småbolag	2010–2016	Yes
Lannebo Fonder	Lannebo Småbolag Select	2010–2016	No
Lannebo Fonder	Lannebo Sverige	2010–2016	Yes
Lannebo Fonder	Lannebo Sverige Flexibel	2013–2016	Yes

Continuing...

Management firm name	Fund name	Years	Return data [Y/N]
Lannebo Fonder	Lannebo Sverige Plus	2010–2016	Yes
Lundmark & Co Fondförvaltning AB	Affärsvärldenfonden A	2015–2016	No
Länsförsäkringar Fondförvaltning AB	Länsförsäkringar Småbolag Sverige A	2010–2016	Yes
Länsförsäkringar Fondförvaltning AB	Länsförsäkringar Sverige Aktiv A	2010–2016	Yes
Nordea Funds Ab	Nordea Alfa	2010–2016	Yes
Nordea Funds Ab	Nordea Olympia	2010–2016	Yes
Nordea Funds Ab	Nordea Småbolagsfond Sverige	2011–2016	Yes
Nordea Funds Ab	Nordea Swedish Stars icke-utd	2010–2016	Yes
Nordea Private Banking Sverige Plus	Nordea Fonder AB	2010–2012	Yes
Nordea Selekta Sverige	Nordea Fonder AB	2010–2012	Yes
Nordea Sverigefond	Nordea Fonder AB	2010–2013	Yes
PSG Capital AB	PSG Micro Cap	2010–2016	No
PriorNilsson AB	PriorNilsson Sverige Aktiv A	2012–2016	Yes
SEB Investment Management AB	Ethos Aktiefond	2010–2016	Yes
SEB Investment Management AB	SEB Stiftelsefond Sverige	2010–2016	Yes
SEB Investment Management AB	SEB Sverigefond	2010–2016	Yes
SEB Investment Management AB	SEB Sverigefond Småbolag	2010–2016	Yes
SEB Investment Management AB	SEB Sverigefond Småbolag C/R	2010–2016	Yes
SEB Investment Management AB	SEB Swedish Value Fund	2010–2016	Yes

Continuing...

Management firm name	Fund name	Years	Return data [Y/N]
SEB Special Clients Sverigefond	SEB Investment Management AB	2010–2013	Yes
SEB Sverigefond Chans/Risk	SEB Investment Management AB	2010–2015	Yes
SKF Allemansfond	SEB Investment Management AB	2010–2014	Yes
Simplicity AB	Simplicity Sverige	2015–2016	No
Skandia Fonder AB	Skandia Cancerfonden	2010–2016	Yes
Skandia Fonder AB	Skandia Småbolag Sverige	2010–2016	Yes
Skandia Fonder AB	Skandia Sverige	2010–2016	Yes
Skandia Fonder AB	Skandia Världsnaturfonden	2010–2016	Yes
Spiltan Fonder AB	Spiltan Aktiefond Dalarna	2010–2016	Yes
Spiltan Fonder AB	Spiltan Aktiefond Småland	2010–2016	Yes
Spiltan Fonder AB	Spiltan Aktiefond Stabil	2010–2016	Yes
Spiltan Fonder AB	Spiltan Aktiefond Sverige	2010–2016	Yes
Strand Kapitalförvaltning AB	Strand Småbolagsfond	2010–2016	No
Swedbank Robur Fonder AB	Folksam LO Sverige	2010–2016	Yes
Swedbank Robur Fonder AB	Folksam LO Västfonden	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Humanfond	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Robur Ethica Sverige	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Robur Ethica Sverige MEGA	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Robur Exportfond	2010–2016	Yes

Continuing...

Management firm name	Fund name	Years	Return data [Y/N]
Swedbank Robur Fonder AB	Swedbank Robur Småbolagsfond Sverige	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Robur Sverigefond	2010–2016	Yes
Swedbank Robur Fonder AB	Swedbank Robur Sverigefond MEGA	2010–2016	Yes
Swedbank Robur Svensk Aktieportfölj	Swedbank Robur	2010–2015	Yes
Tangent Specialfond	Gustavia Fonder	2010–2012	Yes
Öhman Fonder	Öhman Småbolagsfond A	2010–2016	Yes
Öhman Fonder	Öhman Sverige Hållbar A	2013–2016	Yes
Öhman Fonder	Öhman Sverige Koncis A	2010–2016	Yes
Öhman Fonder	Öhman Sverigefond	2010–2016	Yes
Öhman Fonder	Öhman Sverigefond 2 A	2010–2016	Yes
Öhman Fonder	Öhman Sweden Micro Cap	2010–2016	Yes
End of table			

Table 13: All funds in the sample