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Macroeconomic exposure of Swedish firms' revenue and its impact on stock returns

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ABSTRACT

Previous research suggests that by examining the regional origins of revenues and the expected economic growth in regions, supra-normal returns may be achieved by creating zero investment portfolios. Nevertheless, such previous research examines countries with low export dependence and a high internal demand or uses data from a number of countries with different economic dependencies. The purpose of this paper is to study the same field of research, as in existing research, however using data solely from Sweden. Sweden is an economy reliant on export with a market that houses less internal demand than the other countries examined. We investigate the macroeconomic exposure of Swedish firms' revenue together with growth expectations where they face exposure. Based on this exposure and the expected future economic growth we created a variable, $exposure_{it}$, to help explain stock returns. Based on the relationship between our variable and stock returns, we create two zero investment portfolios to try and achieve abnormal returns. We find that for Swedish firms, expected future economic growth has a negative correlation with stock returns, and by following this result the portfolio that takes a long position in stocks with a low $exposure_{it}$ and a short position in high $exposure_{it}$ was able to generate the highest return for the period. We further conclude that it is not possible to achieve abnormal returns based on this strategy.

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Chapter 1
INTRODUCTION

Globalization, or as described by Bordo et al. (2003): the free flow of goods, services and capital in an increasingly integrated market, continues to increase. Firms are gradually becoming more exposed to foreign economies, especially those originating from smaller economies where firm growth prospects are deemed to be smaller due to less domestic demand.

This suggests that foreign exposure should be an indicator of how well a company will perform in the future, given economic forecasts of that region and thus, should be incorporated in the pricing of its stock. Since the financial crisis in 2008, Sweden's export to its traditional trading partners within the Euro area and the US has dropped significantly. At the same time, exports to emerging markets have increased heavily making up for the drop in exports to the Euro zone and the U.S. (Riksbanken 2012). Undeniably, with this increasing interdependent global market, understanding its mechanisms and the role that the macroeconomic factors play, would be of great interest to an investor seeking to forecast firms' performance.

Thomas (2000) examines the relationship between foreign and domestic earnings to see whether the market is miss-pricing stocks. By creating a zero-investment hedge portfolio the author finds that one can, based on regional exposures in earnings, gain an abnormal return. These findings may suggest that the market is in fact not taking regional exposures into account in the pricing of stocks. Li, Richardson and Tuna (2014) further investigates this area of study by specifying regional exposure and concludes that there is sluggishness in incorporating macroeconomic information in security prices by constructing a hedge portfolio. They also find that by using macroeconomic variables you can predict firm fundamentals, such as stock returns.

This study investigates whether you can gain a higher, risk adjusted, return based on the geographical exposures of Swedish firms. To quantify geographical exposures, we create a variable, $exposure_{it}$. We believe that, since Sweden is an export oriented economy, companies therefore face greater geographical exposures than do other companies in less export oriented countries. Given this, it is reasonable to believe that the stock prices of the Swedish companies have already incorporated macroeconomic factors to its prices and it will therefore not be possible to use this information to continuously gain abnormal returns. Based on this, two hypotheses are concluded:

Hypothesis 1: The $exposure_{it}$ variable can explain stock returns.

Hypothesis 2: It is not possible to create a zero-investment portfolio, based on the $exposure_{it}$ variable, that gains abnormal returns in Sweden.

Outline

This paper is structured as follows. In Chapter 2, the previous research on the topic(s) of interest is outlined. In Chapter 3, the theoretical framework is discussed. In Chapter 4, the sources of the data applied to the paper are presented. In chapter 5, the methodology used when testing the hypotheses is detailed. In chapter 6, the results of the statistical tests are presented. In chapter 7, the results are discussed and interpreted. Finally, in chapter 8, the content of the paper is summarized and a conclusion is reached.

Chapter 2
PREVIOUS RESEARCH

The research on the topic of the link between firm specific exposure and the future performance of firm securities is relatively scarce. This chapter discusses the key contributions of the academic community to the subject of interest for this paper, which will lay the foundation for the later chapters. Balakrishnan, Harris and Sen (1990) discuss the link between geographical segment data and the earnings process. Roberts (1989) investigates the predictive accuracy of earnings forecasts based on geographical segment disclosures. Boatsman, Behn and Patz (1993) examines the relationship between equity valuations and geographical segment data. Thomas (2000) researches the link between abnormal returns and disaggregated earnings data in terms of foreign and domestic earnings. Li, Richardson and Tuna (2014) investigates whether the security market experiences sluggishness in incorporating macroeconomic information in security prices. Vassalou (2000) examines the link between news about future GDP growth and stock return movements.

On the contrary to previous authors, Siegel (1998) finds that there in fact is a negative correlation between economic growth and stock returns, and even more so in developed countries. Ritter (2012) finds an equal relationship to Siegel (1998) and argues that, for example, technological advancements benefits the consumer rather than the shareholders.

LINKING DISAGGREGATED SALES DATA TO FIRM PERFORMANCE

Balakrishnan, Harris and Sen (1990) investigates whether geographical segment data contains information regarding the earnings process. To investigate if geographical segment data is a part of a larger information set required to accurately forecast future earnings, Balakrishnan et al (1990) researches the predictive ability of geographic segment data of sales and income.

The authors show that applying disaggregated data to forecasts of income generate superior results. In contrast, the predictive ability of sales using geographic segment data is inconsistently different from predictions using consolidated data. However, when including growth factor adjustments and exchange rate adjustments, sales forecasts based on segment data is superior to sales forecast based on consolidated data.

In a study similar to Balakrishnan et al. (1990), Roberts (1989) researches companies located in the UK, she investigates if the predictive accuracy of forecasts of earnings based on geographical segment data is superior to the predictive accuracy of forecasts of earnings based on consolidated data.

Applying a random walk model, a trend model as well as a random walk model adjusted for (real) nominal GNP growth on a dataset consisting of 78 UK firms, Roberts (1989) find generally smaller mean errors for earnings forecasts generated with geographic segment data. Roberts (1989) show that using prior year earnings to estimate future earnings is insignificantly different from using prior year sales to estimate future earnings. Consequently, there is no additional benefit of using both disaggregated measures to forecast firm performance.

LINKING DISAGGREGATED SALES DATA TO STOCK RETURNS

Further linking segment data to firm performance data, Boatsman, Behn and Patz (1993) examined the connection between equity valuations of multinational companies located in the united states and geographical segment disclosures.

Boatsman et al (1993) find a link between geographical segment disclosures and common security prices. However, the connection is highly dependent on magnitude of unexpected change, region and time period.

Taking a more aggregate perspective on segment disclosures, Thomas (2000) investigates the presence of abnormal returns given the usage of public information about firms' domestic and foreign earnings. The presence (absence) of abnormal returns is in this context closely tied to the inaccuracy (accuracy) of which the market incorporates the pricing effects of the geographical distribution of earnings reported in a firm report. In the case that the market fails to accurately price the signals related to geographical earning disclosures, investment strategies generating abnormal returns can be constructed.

Foreign earnings are shown to be more persistent than domestic earnings and the actual foreign earnings persistence is statistically different from the market's perceived earnings persistence. This is an important finding in Thomas (2000), implying that security prices do not accurately incorporate the time-series behavior of foreign earnings. More specifically, the market underestimates the persistence of foreign earnings. The implication of the market failing to decompose earnings appropriately is that it causes security prices to lag earnings.

Thomas (2000) concludes that the results are due to market mispricing rather than omitted risk factors. Thus, it is probable that the market does not completely understand the persistence of earnings. This implies that it is possible to construct an investment strategy that consistently yields abnormal returns on average by using the predictable price adjustments clustered around future earnings announcements.

Li, Richardson and Tuna (2014) examine the relationship between macroeconomic information and forecasted firm fundamentals. As macroeconomic information, the authors use a measurement of a firm's geographic exposure, which is defined as a combination of firm level exposure and forecasts of country performance. The exposure variable is denoted Macro.

The test in Li et al (2014) is carried out by constructing a hedge portfolio, where Macro and the corresponding stocks are sorted in quintiles according to magnitude. A long position is taken in stocks corresponding to top quintile Macros, and a short position is taken in stocks corresponding to bottom quintile Macros. Thus, securities that are expected to do well on the basis of Macro are held while a short position is taken in securities that are expected to do poorly. The zero-investment portfolio is regressed on a set of explanatory variables; the excess return of a global market mimicking portfolio and the returns of three factor mimicking portfolios. An intercept is obtained that is statistically significant from zero, meaning both abnormal returns and a sluggishness in the pricing of the market are observed.

THE RELATIONSHIP BETWEEN GDP AND STOCK RETURNS

Exploring the use of future GDP as a performance indicator, Vassalou (2003) investigates whether the application of a factor that captures news regarding future GDP growth and a market factor can capture the cross-section movements of equity returns. More specifically, Vassalou (2003) shows that including a factor relating to news of future GDP growth significantly improves the CAPM model's ability to price securities.

Vassalou (2003) show that a factor containing news related to future GDP growth explain equity returns comparably accurately to the Fama-French model. Furthermore, an economic interpretation, given that a significant portion of the information in HML and SMB is news regarding future GDP growth, is given to the ability of HML and SMB to explain the cross-section of equity returns.

Siegel (1998) finds a negative correlation with economic growth and stock returns over a period of 27 years, a relationship that holds for both emerging and developed economies. He argues that the expected future economic growth is already priced in and thus lowering future realized returns. However, Siegel (1998) does not investigate the exposure to foreign economies of the firms listed on the stock exchanges. The correlation is based on a country's economic growth and its own stock index which means information about foreign exposure and its effect on stock returns is neglected.

Ritter (2012) researches the empirical relationship between stock returns and per capita GDP growth. He investigates 19 predominantly developed countries that are characterized with continuously operating stock markets, stretching back to 1900. Surprisingly, he finds a significant negative relationship between GDP growth and stock market returns of -0.39. Additionally, he finds a similar correlation coefficient of -0.41 researching another data sample consisting of 15 emerging markets between 1988 and 2011. The results imply that investors would be better off investing in countries with slower rather than faster per capita GDP growth.

Ritter (2012) gives several explanations to the nature of the relationship. One argument presented is that investors integrate expectations of high growth in the prices, and experience disappointment later in the holding period when earnings and return on capital figures are presented that do not reflect the high growth expectations. Firms are unable to meet investors' high expectations of firm performance, derived from a high belief in the market as a result of high expected economic growth.

OUR CONTRIBUTION

Unlike Balakrishnan et al (1990) and Roberts (1989) we investigate security prices rather than earnings figures and in comparison to Roberts (1989) and Li et al (2014). In addition, we apply segment data at a more disaggregate level than foreign and domestic data and regional data respectively. We construct a macroeconomic exposure variable inspired by Li et al (2014), although we allow the weights as well as the expected performance measure to vary over time. This will help in isolating the predicative ability (incapacity) the $exposure_{it}$ variable has on forecasting stock returns. Further, If the stock prices indeed do not suffer from sluggishness in incorporating macroeconomic variables and therefore mispricing is non-existent, it would suggest that in economies where companies rely on foreign markets, investors cannot obtain abnormal returns based on country level exposure.

Chapter 3
THEORETICAL FRAMEWORK

ABNORMAL RETURNS IN THE CAPM FRAMEWORK

Li et al (2014) find a significant intercept when regressing their hedge portfolio on the Fama & French factor mimicking portfolios, showing abnormal returns as a consequence of the market mispricing macroeconomic information. We will test portfolio performance in two different test settings: A time-series regression setting and comparing Sharpe ratios.

The time-series regression setting is used as an extended version of the CAPM framework, proposed by Sharpe (1964) and Lintner (1965). Regressing the portfolio(s) on the market proxy and standard control variables is a suitable method of investigating the presence of abnormal returns. If a significant positive intercept is obtained, the portfolio has generated excess returns that are not explained by the market or the control variables. This is indicative of market mispricing: The market fails to account for the macroeconomic information and price it accordingly.

The general CAPM framework with the inclusion of control variables is defined as follows:

$$Portfolio_{xt} - Rf_t = \alpha + \beta_{OMXS60}(OMXS60_t - Rf_t) + \sum_{k=1}^{K} \beta_k C_{kt} \tag{3.1}$$

Where $Portfolio_{xt}$ is the monthly return of portfolio x at time t, Rf_t is the average risk-free interest rate at time t, $OMXS60_t$ is the return of the market index at time t and C_{kt} is the realization of control varible k at time t.

MEASURING ABNORMAL RETURNS WITH SHARPE RATIOS

The Sharpe ratio is a measure of portfolio performance, where the mean return in excess of the risk free rate is adjusted for the volatility of the portfolio. Thus, it measures the performance of the portfolio in the mean-variance dimension. The purpose of calculating Sharpe ratios is to compare the performance across portfolios. To test for the equality of Sharpe ratios, we apply the methodology proposed by Jobson and Korkie (1981).

The general Sharpe ratio is defined as follows:

$$SR_p = \frac{\overline{R_p} - Rf}{\sigma_p} \tag{3.2}$$

where SR_p is the Sharpe ratio for portfolio p, R_p is the average return for portfolio p, Rf is the risk free rate and σ_p is the standard deviation of portfolio p.

To test for the equality of two Sharpe ratios we formulate the following hypothesis:

$$H_0 : sr_{ij} \equiv sr_i - sr_j = 0 \tag{3.3}$$

$$H_1 : sr_{ij} \equiv sr_i - sr_j > 0 \tag{3.4}$$

The transformed difference is applied:

$$\hat{sr}_{ij} \equiv \hat{sr}_i - \hat{sr}_j = \frac{\mu_i}{\sigma_i} - \frac{\mu_j}{\sigma_j} = \sigma_j \mu_i - \sigma_i \mu_j \tag{3.5}$$

The asymptotic distribution of the transformed difference statistic is normal and has a mean equal to sr_{ij} and a variance equal to:

$$\theta = \frac{1}{T}\left[2\sigma_i^2\sigma_j^2 - 2\sigma_i\sigma_j\sigma_{ij} + \frac{1}{2}\mu_i^2\sigma_j^2 + \frac{1}{2}\mu_j^2\sigma_i^2 - \frac{\mu_i\mu_j}{2\sigma_i\sigma_j}[\sigma_{ij}^2 + \sigma_i^2\sigma_j^2]\right] \tag{3.6}$$

σ_{ij} is the estimated covariance between the excess returns of portfolio i and j. We then obtain the test statistic:

$$z(sr_{ij}) = \frac{\hat{sr}_{ij}}{\sqrt{\theta}} \sim N(0,1) \tag{3.7}$$

The null hypothesis is rejected if

$$z(sr_{ij}) > z_\alpha \tag{3.8}$$

where z_α is the critical value in the standard normal distribution given a significance level of α.

Chapter 4
DATA SOURCES

In this subsection, the sources of the financial and macroeconomic data are highlighted. First, the data sources used to construct the $exposure_{it}$ variable are outlined. Second, financial data sources and control variable sources are presented.

$Exposure_{it}$ for a firm is a product of real GDP growth forecasts and firm specific geographical segment sales data. Real GDP growth forecasts are retrieved from International Monetary Fund, through the economic outlook data base. GDP growth forecasts of the next year, made in the end of the previous year, are collected for each year in the time period 2007-2016 for each country in the world.

Geographical segment data for the ten-year period is retrieved from the Orbis data base, from the *segment data - geographic segment* section. Disaggregated sales data is available for 50 firms in the OMXS60 index. The data collected is the latest disaggregated sales data available for each firm. For a majority of the firms this data is available at the end of February.

Stock data is retrieved from Nasdaq in the form of daily prices between 2007-2016 for a benchmark portfolio, OMXS60, and for the 50 stocks in the sample. Year-end data for the number of shares outstanding is collected for each firm from Orbis, from the *stock data* section. The firm specific control variables are collected from Orbis, from the *stock valuation* section. Average figures over each annum in the ten-year period are collected.

The macroeconomic control variables are retrieved from Riksbanken's database. Average annual figures and monthly measures are used. Average inflation per annum is downloaded from OECD data.

Chapter 5
METHODOLOGY

This paper's main topic of research is whether abnormal returns can be gained on the Swedish stock market using forecasts of GDP growth and firms' geographical segment data disclosures. The tests associated with the topic are conducted in two major stages. First, the relationship between one year holding period returns and the $exposure_{it}$ variable is tested for in a panel data setting. Second, a zero-investment hedge portfolio is created based on the relationship. To test whether the hedge portfolio generates abnormal returns, the performance of the portfolio is compared to the performance of a market portfolio through *i*) the Sharpe ratio *ii*) testing for a significant intercept in a time-series regression setting.

The methodology chapter is structured as follows. First, the creation of the $exposure_{it}$ variable is outlined. Second, the panel data setting is reviewed and finally, the creation of the zero-investment hedge portfolio and the subsequent tests are discussed.

EXPOSURE VARIABLE

The $exposure_{it}$ variable is created for each firm, for each year starting from 2007 up until 2016. The variable is a combination of disclosed geographical segment data of sales in the latest annual report and the foretasted GDP growth in that region. To create $exposure_{it}$ for 2016 we use the segment data of a firm's sales 2015 and the expected performance for respective region 2016. Mathematically it can be shown as:

$$Exposure_t = \sum_{c=1}^{C} Sales_{ic,t-1} E_{t-1}[Performance_{ct}] \tag{5.1}$$

where $Sales_{ic,t-1}$ is sales in one region at time $t-1$ for company i where we have standardized the measure so that it sums to one. The expected country performance is the forecast of real GDP growth.

Sales is the metric chosen as a proxy for firms' regional exposures rather than earnings. Disaggregated sales are available for each period, which is not the case for disaggregated earnings. Furthermore, disaggregated earnings are more likely subject to managerial discretion, since earnings rather than sales are taxed. Roberts (1989) finds no additional benefit of using both disaggregated measures.

A firm with a sales exposure of 50 percent in the Nordics and 50 percent in China would be given an $exposure_{it}$ equally weighted on these regions' expected future performance. Whenever available, country-level data has been used. However, some firms disclose only regional sales, e.g. "Asia", "Europe" etc. In such cases, the future expected performance of the region is weighted as each country's share of the GDP in the region times its own expected future performance:

$$E[Asia_t] = \sum_{c=1}^{C} w_{c,t-1} E_{t-1}[Performance_{ct}] \tag{5.2}$$

where $w_{c,t-1}$ is the weight of country c's GDP compared to the region as a whole, naturally $\sum_{c=1}^{C} w_{c,t-1}$ sums to one. When regions have been split in to sub regions in the disclosure of sales, i.e. Middle East, East Asia and so forth, the expected performances have been calculated separately for those regions based on what countries make up the specific sub region. Similarly, for cases when sales disclosure is labelled as 'Other' or 'Rest of the World' we have for each individual case removed all previous mentioned regions in the annual report and treated the remaining regions as one market. If an annual report discloses sales in North America, Europe, Middle East and Africa and Other, then 'Other' would be comprised of the expected performance of Asia less Middle East combined with Oceania and South America. For this paper $exposure_{it}$ is calculated for the 60 most traded stocks on OMXS60, this has yielded a total of 50 company specific $exposure_{it}$ variables over ten years due to several companies having both their A and B stock traded and companies not disclosing geographic sales data. An example of how the $exposure_{it}$ variable was constructed for Ericsson 2016 is found in table B.1 in the appendix. The use of the $exposure_{it}$ variable in a panel data setting makes it able to capture the cross-sectional and the time-series variation and its potential effect on firm specific variables, such as stock returns. In figure B.1 to B.3 in appendix B you will find descriptive statistics of the variable.

PANEL DATA

The sample of Swedish firms used throughout the paper are the firms with the most traded stocks, with available geographical segment disclosures. The end sample consists of 50 Swedish firms, constituting in part the OMXS60 general equity index, spanning over 10 years.

In line with previous research, monthly returns were calculated (see equation A.3, appendix A). In this paper, monthly returns are defined as the return over a month where the investor purchased the stock at the opening price on the first trading day of the month and sold the stock at the closing price on the last trading day of the month. $Exposure_{it}$ is reported on an annual basis. To assess general trends in the data, yearly stock returns were calculated in an identical manner to monthly stock returns (see equation A.4 in appendix A).

For each firm, the correlation between its yearly stock returns and its exposure variable was calculated. Contrary to prior research, the correlation between the exposure variable and stock returns are in most cases negative. However, caution should be applied to any conclusions drawn from this fact: the correlations are calculated on just 10 pairwise observations for each firm.

To investigate the usefulness of the exposure variable, the effect of $exposure_{it}$ on stock returns was tested in a more sophisticated setting. Using a panel data setting, we allow for variance in the cross section dimension as well as in the time dimension. The initial panel structure consists of 500 firm year observations. The structure includes yearly holding period stock returns, the exposure variable and several standard control variables. The control variables are of two categories: Measures that capture firm specific performance and macroeconomic variables that capture the state of the economy. The firm specific variables should capture some of the cross-sectional variation while the state of the economy factor should capture in part the time dimension variation. For a description of the variables used in the panel data regressions see table 5.1.

To test for the appropriateness of the data, stationarity tests were performed for each of the variables in order to avoid spurious regressions (Brooks, 2014). The null hypothesis, that the variable contains a unit root, was rejected for all variables except for the exchange rate (see table B.6 in appendix B). To account for the non-stationarity, the first difference of the exchange rate was applied to the data set. In economic terms, this means that we investigate the effect of the change in the SEK/USD exchange rate on yearly holding period returns.

To test for the presence of multicollinearity in the data, we looked at the correlation between each of the independent variables (table B.5 in appendix B). Near multicollinearity is regularly present in the data when conducting economic research. An acceptable method of measuring multicollinearity is with the use of correlation matrices, as proposed in Brooks (2014). The presence of multicollinearity will spuriously yield high explanatory power, high standard error and insignificant coefficients. Commonly, a correlation coefficient of 0.8 is used as a threshold, but a threshold of 0.5 will be applied in this paper.

Multicollinearity is likely to be present when including more than one macroeconomic variable in the regression. Further, some of the firm specific variables are calculated using the same numerator, and can not be included simultaneously in a regression. Other firm variables are characterized with high pairwise correlation, and are not used in the same regression setting.

The dataset runs over a period that includes a financial crisis. Consequently, it is especially important to test whether the data is affected by significant time heterogeneity. However, as many of the control variables in some way capture time-specific effects, applying fixed effects automatically is not possible since this leads to significant multicollinearity. Instead, we apply the chow-test manually for the regressions (Brooks, 2014).

The Chow-test is shown in equation A.1 in appendix A. The test for poolability applied to test for period heterogeneity entails comparing the sum of the residual sum of squares (RSS) for cross-sectional regressions run for each year in the time period to the RSS for the pooled panel data regression.

The results of the test showed significant heterogeneity in the time dimension. Since the implementation of fixed effects directly is impossible due to multicollinearity issues, the within transformation, as suggested by Brooks (2014), was used. The within transformation applied to the time dimension entails demeaning all variables included in the panel data setting with respect to the annual average. This is effectively equivalent to including period fixed effects, without the loss of degrees of freedom. The within transformation is implemented in the following manner:

$$y_{it} - \overline{y_t} = \sum \beta_i (x_{it} - \overline{x_t}) + (\bar{\epsilon}_{it} - \epsilon_t) \tag{5.3}$$

The macroeconomic variables lack cross-sectional variation and are consequently not transformed. Post the implementation of the within transformation, a new correlation matrix was constructed to investigate signs of multicollinearity.

In the cross-section dimension, heterogeneity is investigated through including fixed effects and testing for the redundancy of fixed effects through the redundant fixed effects test that generates a likelihood ratio statistic (Brooks, 2014). To test for the choice between random effects and fixed effects, a Hausman specification test was applied.

Given a certain regression specification, two additional tests were performed.
The Durbin-Watson test investigates whether the residuals are serially correlated. The test-statistic is generated automatically as a part of the regression output.

Heteroscedasticity in the residuals was tested for, and when appropriate, accounted for using White-robust standard errors. If heteroscedasticity is present in the data, the estimated coefficients will no longer be of minimum variance (Brooks, 2014). Heteroscedasticity was tested for manually, by regressing the squared residuals obtained from the regression on the independent variables used in the setting. Period robust, cross-sectionally robust or diagonally robust standard errors were used depending on the nature of the fixed effects applied to the regression.

In total, 12 panel data regressions were performed. The general regression equation is:

$$Return_{it} = \alpha + \beta_{exp} Exposure_{it} + \sum_{k=1}^{K} \beta_k F_{ikt} + \sum_{l=1}^{L} \beta_l M_{lt} \tag{5.4}$$

Where $Return_{it}$ is the return on company i's stock at time t, $Exposure_{it}$ is the exposure variable for firm i at time t, F_{ikt} is the firm specific control variable k for firm i at time t and M_{lt} is the macroeconomic control variable l at time t.

The variables included in the panel data regressions and the results of the diagnostics tests are presented in table 5.2. The results of the regressions are discussed in a later chapter.

Variable	**Description**
Returns	1 year holding period stock returns
$Exposure_{it}$	The sales weighted average of expected GDP growth for each firm.
SEK/USD	SEK/USD exchange rate, average monthly.
Divpayout	The dividend payout as a percentage of earnings for each firm, yearly.
Divyield	The dividend yield for each firm, yearly.
Earn Yield	The earnings yield for each firm, yearly.
MCap/SF	Market cap over shareholder funds, yearly.
P/BV	Price over book value for each firm, yearly.
P/E	Price over equity for each firm, yearly.
P/CF	Price over cashflow for each firm, yearly.
Repo	The Swedish Repo rate, yearly average.
Inflation	The Swedish inflation rate, monthly.
TQ	Tobin's q for each firm.

Table 5.1: Variable description

Equation	Period Fixed Effects	CS Fixed Effects	Heteroscedasticity	D-W
$Return_{it} = Exposure_{it} + Divpayout_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	1.9
$Return_{it} = Exposure_{it} + P/CF_{it} + SEK/USD_t$	Yes, Within Transformation	Yes	Yes, White Diagonal Robust SE's	2.7
$Return_{it} = Exposure_{it} + TQ_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	2.4
$Return_{it} = Exposure_{it} + Inflation_t + Mcap/SF_{it} + Divpayout_{it}$	Yes, Within Transformation	Yes	No	1.99
$Return_{it} = Exposure_{it} + Earnyield_{it} + TQ_{it}$	Yes, Within Transformation	Yes	Yes, White Diagonal Robust SE's	1.92
$Return_{it} = Exposure_{it} + Inflation_t + P/BV_{it}$	Yes, Within Transformation	No	No	2.35
$Return_{it} = Exposure_{it} + Mcap/SF_{it} + Divpayout_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	1.93
$Return_{it} = Exposure_{it} + TQ_{it} + Inflation_t + P/E_{it} + Mcap/SF_{it} + Divyield_{it}$	Yes, Within Transformation	Yes	Yes, White Diagonal Robust SE's	2.04
$Return_{it} = Exposure_{i,t-1} + Divpayout_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	1.95
$Return_{it} = Exposure_{i,t-1} + P/CF_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	2.36
$Return_{it} = Exposure_{i,t-1} + Mcap/SF_{it} + Divpayout_{it} + SEK/USD_t$	Yes, Within Transformation	No	Yes, White Period Robust SE's	1.94
$Return_{it} = Exposure_{i,t-1} + TQ_{it} + Inflation_t + Mcap/SF_{it} + Divyield_{it}$	Yes, Within Transformation	No	No	1.95

Table 5.2: Summary table of the specification of each panel data regression

ZERO-INVESTMENT PORTFOLIO

The second stage of tests is based on the nature of the relationship between $exposure_{it}$ and stock returns. $Exposure_{it}$ is, quite surprisingly, shown to have a negative effect on stock returns, although the relationship is not robust. This deviates from previous findings, where a variable constructed with geographical segment disclosures are positively correlated with stock returns, sometimes with a lag. We find no significant relationship when including $exposure_{i,t-1}$ with a lag.

If the effect of $exposure_{it}$ on stock returns was positive, it is appropriate to construct a zero investment hedge portfolio based on the size of $exposure_{it}$. Similar to in Li et al (2014), firms can be sorted in quintiles according to size of the exposure variable. Then, a long (short) position is taken in firms with high (low) exposures. This approach is reasonable only when the relationship between $exposure_{it}$ and stock returns is positive. That is to say, that you take a long position in firms that are expected to do well (the weighted GDP forecasts of countries that the firms are selling to are high relative to other firms in the sample) and a short position in firms that are expected to do poorly (the weighted GDP forecasts of countries that the firms are selling to are low relative to other firms in the sample). However, if the opposite relationship is true, the portfolio could gain abnormal returns through a long position in low $exposure_{it}$ stocks and a short position in high $exposure_{it}$ stocks. In order to compare our approach (denoted portfolio *i*) to the more intuitive Li et al. (2014) approach (denoted portfolio *ii*), we create both portfolios. The investment strategies are outlined in table B.9 in appendix B.

The purpose of creating the zero-investment hedge portfolio(s) is to assess whether significant abnormal returns can be gained from using information external to the firm (the exposure measure) and invest accordingly. This is indicative of market mispricing: abnormal returns can be gained if the market fails to accurately price macroeconomic information due to inefficiency in the market.

We will compare the performance of portfolio *i* to portfolio *ii* and the market portfolio. As a proxy for the market portfolio, OMXS60 is used. OMXS60 is a suitable proxy for two reasons: it consists only of Swedish firms, which makes the comparison suitable, and it's a value weighted index of the 60 most traded Swedish firms.

Since annual reports, including geographical segment data, are usually available to the public at the end of February, the placement period is between the first trading day of march and the last trading day of February. Consequently, the zero-investment portfolio(s) will consist of 118 monthly returns (march 2007-december 2016).

First, firms are sorted in quintiles based on the magnitude of $exposure_{it}$. This entails ten stocks in the long position and ten stocks in the short position in both zero-investment portfolios. The firms are sorted every year, allowing for the composition of stocks to change annually.

To value weight the portfolios, a measure of market capitalization is needed. Shares outstanding for each firm, for each year is obtained through Orbis. Resting on the assumption that the number of shares outstanding is constant for each calendar year, market capitalization for each month is calculated as the product of opening price per share on the first trading day of the month and the number of shares outstanding. This allows the weights of each portfolio to vary monthly. Further, this is in line with the prior calculation of monthly returns: Investors adjust their portfolios per the market capitalization of the included stocks at the first trading day of each month. The calculation is shown in equation A.2 in appendix A.

TESTING FOR SIGNIFICANT ALPHAS IN THE CAPM FRAMEWORK

To implement the CAPM model, control variables must be chosen and standard diagnostic tests must be performed to ensure the appropriateness of the data and the validity of the tests.

The control variables investigated are macroeconomic variables that should capture some of the variation in the time dimension. Due to multicollinearity issues, just one macroeconomic control variable can be included in the regression setting at a time. Since excess returns are investigated in the CAPM framework, the interest rate is accounted for in the time dimension, rendering interest rate control variables redundant. The control variable deemed most appropriate which is included the regression equations is the future rate for the SEK/USD exchange rate.

The time-series regression equation is defined as follows:

$$Portfolio_{xt} - Rf_t = \alpha + \beta_{OMXS60_t}(OMXS60 - Rf_t) + \beta_{SEK/USD} SEK/USD_t \quad (5.5)$$

Where $Portfolio_{xt}$ is the monthly return of portfolio x at time t, Rf_t is the average monthly interest rate for the 10 year Swedish government bond, OMXS60 is the monthly return of the market index and SEK/USD is the change in future rate of the SEK/USD exchange rate.

The time series regressions are controlled for heteroscedasticity and ARCH effects, which are not present in the data(Brooks, 2014). However, the future rate of the SEK/USD exchange rate possesses a unit root, which is removed by first differencing the variable.

TESTING FOR SIGNIFICANT DIFFERENCES IN SHARPE RATIOS

There are possibly significant earnings announcement effects visible in the data. Furthermore, we hypothesize that any potential abnormal returns will be concentrated to a period less than a year post the regional sales disclosures at the time of the distribution of the annual reports around the end of February. To try to capture possible short-term abnormal returns, we measure the excess returns over the four quarters: i) the first quarter after the distribution of annual reports ii) the first two quarters after the distribution of annual reports iii) the first three quarters after the distribution of annual reports iv) the full four quarters after distribution of annual reports.

This methodology approach gives rise to four sub-samples of monthly return data: i) 30 observations of March to May monthly returns between 2007-2016 ii) 60 observations of March to August monthly returns between 2007-2016 iii) 90 observations of March to November monthly returns between 2007-2016 iv) 118 observations of March to February monthly returns between 2007-2016. See table B.7 in appendix B for descriptive statistics for each sub-period.

To capture the possibility that abnormal returns are concentrated to certain time periods post the distribution of annual reports, we measure the excess returns over four sub samples over the ten-year period. The Sharpe ratio is defined as follows, for each of the four sub samples:

$$SR_{ps} = \frac{\overline{R_{ps}} - Rf_s}{\sigma_{ps}} \tag{5.6}$$

where SR_{ps} is the average monthly Sharpe ratio for portfolio p for sample s over the 10-year period, R_{ps} is the average monthly return for portfolio p in sample s over the 10-year period, Rf_s is the average monthly risk free rate in sample s over the 10-year period and σ_{ps} is the standard deviation of portfolio p in sample s over the 10-year period.

Chapter 6
RESULTS

This chapter will present the results from the tests of hypothesis 1 and hypothesis 2. The chapter is divided into two subsections: First, the results obtained from the panel data regressions that tests hypothesis 1 are outlined. Second, the results from the portfolio performance tests that tests hypothesis 2 are presented.

PANEL DATA

This section will present the results obtained from the panel data regressions. First, the significant regression settings are detailed. Second, the insignificant regression settings are presented. Third, the regression settings including $exposure_{i,t-1}$ with a lag are shown.

Table 6.1 reports the estimate regression coefficients from 4 equations where one year holding period stock returns are regressed on $exposure_{it}$ along with different combinations of control variables.

In the first regression setting, $exposure_{it}$ is negative and significant at the five percent level, including firm dividend payout ratio and the change in the SEK/USD exchange rate as control variables. The control variables are significant at the one percent level. The beta coefficient of the exposure variable has a straightforward interpretation: When the weighted average of expected performances in regions that a firm is exposed to increases with one percentage unit, the annual holding period return on a firm's stock will on average decrease with 9.81 percentage units. It is important to keep in mind that a one percentage unit increase in $exposure_{it}$ is a dramatic change, it represents a one percentage increase in average GDP forecasts.

The estimation of the second equation generates a negative, significant beta coefficient for $exposure_{it}$ at the ten percent significance level. The variables included for control measures are the change in the SEK/USD exchange rate and firm level price to cash flow ratios. The effects of the control variables on annual holding period returns are not significantly different from zero. The magnitude of the beta coefficient for $exposure_{it}$ in equation two is similar to the size of the beta coefficient for $exposure_{it}$ in equation one. A one percentage unit increase in the exposure measure has on average yielded an 8.74 percentage unit decrease in annual holding period returns.

In the third regression setting, $exposure_{it}$ is negative and significant on the five percent significance level. There are two control variables that are significant at the one percent level: Dividend payout ratio and the change in the SEK/USD exchange rate. A third control variable, market capitalization as a ratio of shareholder funds, is insignificant. Again, the magnitude of a one percentage unit increase in $exposure_{it}$ is similar to in the prior settings. A one percentage unit decrease in the exposure variable has on average resulted in annual returns decreasing with 9.62 percentage units.

The estimate of the effect of $exposure_{it}$ on Swedish stock returns in the fourth equation generates similar results. The coefficient is negative and significant at the ten percent level. Two control variables are significant at the five and one percent significant levels respectively: Market capitalization over shareholder funds and inflation. Three insignificant control variables are included in the regression setting: Tobin's Q, price over earnings and dividend yield. Again, the interpretation of the exposure variable coefficient is similar: A one percentage unit decrease in the exposure variable has on average resulted in annual returns decreasing with 9.38 percentage units.

Further investigation was conducted as to the effect of $exposure_{it}$ on annual stock returns. Although the relationship does not switch signs, there are noteworthy signs of a lack of robustness to the relationship. In four consequent panel data estimations, the effect of an increase in $exposure_{it}$ was not significantly different from zero on one year holding period stock returns. See table B.2 in appendix B. $exposure_{it}$'s beta coefficient is insignificant when including the exposure measure with *i*) Tobin's Q and the change in the USD/SEK exchange rate *ii*) inflation, market capitalization over shareholder funds and dividend payout ratio *iii*) Tobin's Q and earnings yield *iv*) Inflation and price over book value.

Li et al (2014) find a positive relationship between stock returns and an exposure variable when including the variable with a lag. The effect of lagged $exposure_{it}$ on annual stock returns was researched, and the results are presented in table B.3 in appendix B. In four estimations with different sets of control variables, the effect of an increase in $exposure_{it}$ in last period yields no significant change in annual stock returns the period after. The exposure variable was used as a regressor along with control variables that generated a significant relationship between $exposure_{it}$ and stock returns previously. The control variables used in the equations are *i*) the dividend payout ratio and the change in the SEK/USD exchange rate *ii*) the change in the SEK/USD exchange rate and firm level price to cash flow ratios *iii*) dividend payout ratio, the change in the SEK/USD exchange rate and market capitalization over shareholder funds *iv*) Tobin's Q, inflation, price over equity, market cap over shareholder funds and the dividend yield.

Given that the exposure variable in the last period cannot be shown to affect stock returns in the next period is a logical and expected conclusion. The $exposure_{it}$ variable is composed of GDP growth forecasts for the same year that the stocks are generating returns, value weighted according to last periods GDP magnitudes. It is a reasonable assumption that the weighted GDP forecasts for e.g. 2015, made at the end of 2014, does not affect the realized stock returns during 2016.

Eq Name:	Eq 1	Eq 2	Eq 3	Eq 4
Dep. Var:	Return	Return	Return	Return
$Exposure_{it}$	−9.81	−8.74	−9.62	−9.38
	(4.79)	(5.21)	(4.14)	(5.50)
	[−2.05] ∗∗	[−1.68]∗∗∗	[−2.32] ∗∗	[−1.70]∗∗∗
DIVPAYOUT	−0.06		−0.06	
	(0.02)		(0.02)	
	[−2.86]∗		[−2.73]∗	
SEK/USD	−0.14	0.01	−0.14	
	(0.04)	(0.11)	(0.04)	
	[−4.06]∗	[0.05]	[−3.96]∗	
C		−0.00		−0.06
		(0.02)		(0.04)
		[−0.01]		[−1.77]
P/CF		0.00		
		(0.00)		
		[1.25]		
MCap/SF			0.03	0.22
			(0.02)	(0.10)
			[1.62]	[2.20] ∗∗
Inflation				4.50
				(1.70)
				[2.65]∗
TQ				0.00
				(0.00)
				[0.24]
PE				−0.00
				(0.00)
				[−0.29]
Divyield				0.79
				(2.11)
				[0.37]
Observations:	369	425	369	379
R-squared:	0.08	0.15	0.08	0.20
F-statistic:	NA	1.30	NA	1.62

Table 6.1: Regression results 2007-2016

$*** = p < 0.1$, $** = p < 0.05$, $* = p < 0.01$

In conclusion, we find a negative relationship between the geographic exposure measure and one year holding period stock returns. The relationship is not robust. Further, we find no significant relationship between annual returns and $exposure_i, t-1$ with a lag.

Seeing as the relationship between stock returns and expected geographical segment performance is not positive deviates from previous research findings. Li et al (2014) find a positive relationship between the exposure variable and stock returns, where a zero-investment hedge portfolio can be created based on the macroeconomic measure that generates abnormal returns. Thomas (2000) finds significant foreign earnings persistence, and uses this fact to create ha zero-investment hedge portfolio that generates abnormal returns. Vassalou (2003) shows that applying a factor relating to news about GDP growth to a dataset can explain the cross section of equity returns as well as the Fama and French mimicking portfolios.

In view of the fact that the $exposure_{it}$ measure in many regressions is insignificant in explaining the movement of stock returns is in itself a discrepancy from previous theory. Balakrishnan et al (1990), Roberts (1989) and Boatsman et al (1993) find the use of disaggregated sales data to increase to predictive ability in firm performance forecasts.

Siegel (1993) finds a negative correlation between economic growth and stock returns. Although Siegel (1993) tests the relationship with the use of realized economic growth figures and does not include economic growth in foreign countries in the analysis, the results are in line with the results generated from the tests in this paper.

PORTFOLIO PERFORMANCE TESTS

This section will detail the results obtained from the portfolio performance tests. The section is structured as follows. First, some descriptive statistics regarding the returns of portfolio i, portfolio ii and the market index are presented. Second, the results from the time-series regression are outlined. Third, the results from the Sharpe ratio equality tests are shown.

Portfolio i is the portfolio that performed the best over the whole period and managed

Period	Average Monthly Return		
	OMX60	i	ii
mar 2007-feb 2008	−0.0115	0.0024	−0.0024
mar 2008-feb 2009	−0.0315	−0.0048	0.0048
mar 2009-feb 2010	0.0269	0.0121	−0.0121
mar 2010-feb 2011	0.0224	0.0039	−0.0039
mar 2011-feb 2012	0.0048	0.0161	−0.0161
mar 2012-feb 2013	0.0061	0.0168	−0.0168
mar 2013-feb 2014	0.0143	0.0081	−0.0081
mar 2014-feb 2015	0.0268	−0.0059	0.0059
mar 2015-feb 2016	−0.0071	−0.0036	0.0036
mar 2016-dec 2016	0.0152	0.0081	−0.0081
mar 2007-Dec 2016	0.0065	0.0053	−0.0053

Table 6.2: Summary table of the returns of portfolio *i* and *ii*

to generate an average monthly of 0.53%. Over the whole investment period, 2007-2016, portfolio *ii* had an average monthly return of −0.53%. In comparison, for the same period, OMXS60 had a a monthly average return of 0.65%.

TESTING FOR SIGNIFICANT ALPHAS IN THE CAPM FRAMEWORK

In our time series regression when controlling for alpha we were unable to find a significant alpha in either of the constructed portfolios (Table B.7) implying that in our portfolios there have been no abnormal returns during the period which differs from previous results obtained by Li et al (2014) and Thomas (2000), Table 5.4. These results suggest that, for Swedish firms, abnormal returns are not obtainable by pursuing this investment strategy.

$HEDGE_{xt} - Rf_t = \alpha + \beta(OMXS60_t - Rf_t) + \sum \beta_{it} C_{it}$		
Dep. Var:	$Portfolio_i$	$Portfolio_{ii}$
α	0.00	-0.01
	(0.00)	(0.00)
	[0.76]	[-1.56]
$OMXS60_t - Rf_t$	-0.04	0.05
	(0.10)	(0.10)
	[-0.41]	[0.48]
SEK/USD	-0.03	-0.10
	(1.02)	(1.01)
	[-0.03]	[-0.10]
Observations:	117	117
R-squared:	0.00	0.00

Table 6.3: Regression results when testing for significant alphas of our four hedge portfolios. $OMXS60_t - Rf_t$ is the excess return on the market portfolio and SEK/USD is the 3 month future rate on the SEK/USD exchange rate.
$*** = p < 0.1$, $** = p < 0.05$, $* = p < 0.01$

TESTING FOR SIGNIFICANT DIFFERENCES IN SHARPE RATIOS

The Sharpe ratios of the market index and the two value weighted portfolios are significantly different in all sub-periods. All differences are significant at the one percent level, both for one-sided and two-sided significance tests.

The performance of portfolio i relative to the market index is ambiguous. If the portfolio strategy is to hold the $exposure_{it}$ portfolio three months post the geographical segment disclosure, the strategy will yield significantly lower risk-adjusted returns compared to the market. If the strategy is to hold the portfolio between six and nine month post distribution of annual reports, the strategy will generate significant abnormal returns. If the strategy is to continuously hold a portfolio, implying that you adjust the stocks that comprise the portfolio each annum according to the size of $exposure_{it}$, the strategy will yield lower risk-adjusted returns to the market.

The Sharpe ratio for portfolio ii is significantly smaller than the Sharpe ratio for the market index. The relationship holds independent of placement length each annum.

The performance of portfolio i relative to portfolio ii is unambiguous. Portfolio i outperforms portfolio i over the ten-year period, independent of if you hold the portfolio for 3, 6, 9 or 12 months each year. This is contradicting to the results of Li et al (2014). Given the sample used in this paper, it is significantly better to short (long) high (low) $exposure_{it}$ stocks than the other way around. A summary table for the 4 different holding periods is found in table B.7 in appendix B.

Table 6.4: Significance test of differences in Sharpe ratios
$*** = p < 0.1$, $** = p < 0.05$, $* = p < 0.01$

	$Portfolio_i - OMXS60$	$Portfolio_{ii} - OMXS60$	$Portfolio_i - Portfolio_{ii}$
3M	$-0.3183*$	$-0.5870*$	$0.2687*$
6M	$0.0399*$	$-0.3197*$	$0.3597*$
9M	$0.0145*$	$-0.1995*$	$0.2140*$
12M	$-0.0260*$	$-0.2337*$	$0.2077*$

In summary, we have inconclusive results in generating any abnormal returns on the Swedish stocks based on the strategy of creating a zero investment portfolio based on $exposure_{it}$.

Chapter 7
DISCUSSION

This chapter will contain a discussion regarding the results obtained in chapter 6. The discussion is divided in two parts. Firstly, an interpretation of the results is presented. Secondly, the implications of the data set applied in this examination are discussed.

INTERPRETATION OF RESULTS

The data suggest that there is a negative relationship between weighted expected performance and stock returns for Swedish stocks. The correlation implies that investors would be better of investing in firms with a regional exposure towards low expected GDP growth regions rather than high expected growth regions. Our results deviate from past research in the field in the usage of disaggregated sales data in forecasts. The inference of the relationship between stock returns and the $exposure_{it}$ variable is the opposite of the interpretation of the relationship between the two in the tests conducted by Li et al (2014). Some may find this result illogical. However, Siegel (1998) and Ritter (2012) both find a negative correlation between realized economic growth and stock returns in two different sample sets. Ritter (2012) offers an explanation to why expected growth and future returns are negatively (un)correlated. The argument is based on general stock returns and expected economic growth in the same country, but is applicable in this more complex setting as well. The stock price is a function of dividends, earnings and consequently sales. Shareholders in a firm with a large fraction of sales to high expected growth economies (represented in a large $exposure_{it}$), will overestimate the effect the economic growth has on the firm's sales and earnings and consequently the expected return of their holdings. When actual earnings (sales) figures are released, disappointment characterizes the markets and results in a price drop. One reason for the overestimation is the market's inability to accurately assess the link between economic growth and shareholder returns, which according to Ritter (2012) is nonexistent.

The data suggests that investors can use a combination of disaggregated sales data and macroeconomic information to construct portfolios that generate abnormal returns. Investors would need to apply a train of thought like Ritter (2012), and speculate against the fact that the market overestimates the importance of where sales take place geographically. Thus, if the market is likely to overestimate the future sales (earnings) and consequently the stock price increases of firms that have historically had a large relative fraction of income streams from high growth countries, investors should short high $exposure_{it}$ stocks. If market overestimation is prevalent, investors should be able to gain abnormal returns on zero-investment portfolios comprised of high (low) $exposure_{it}$ stocks in the short (long).

To test if abnormal returns are attainable using the exposure measure, we construct two zero-investment portfolios. As expected, the portfolio with a long (short) positions in high (low) $exposure_{it}$ stocks achieves poor risk-adjusted returns. This contradicts the findings of Li et al (2014) but is in accordance with the panel regressions.

The portfolio with a long (short) positions in low (high) $exposure_{it}$ stocks perform significantly better than the portfolio constructed on the basis of the reverse investment strategy. However, it is ambiguous if the portfolio performs better than the market. Portfolio i has a significantly larger Sharpe ratio than the market index when holding the portfolio for six and nine months respectively. However, the market outperforms portfolio i when the portfolio is held for three months, which contradicts the post-announcement drift discussed by Ritter (2012). Further, the market index has a significantly larger Sharpe ratio than portfolio i when held for the full 12 month period.

Investors should be cautious when interpreting the portfolio performance results. When the performances of the portfolios are tested for in the CAPM framework, no significant intercepts are found. This implies that no lasting abnormal returns have been generated over the period. The time-series regression framework was applied to the 3, 6 and 9 month holding periods, although not discussed in detail, which provided no deviation from the result.

IMPLICATION OF SAMPLE SELECTION

There are important distinctions between the sample of Swedish firms used in this paper and the data sets used in previous research. Thomas (2000) uses U.S. firm data. The U.S and Sweden differ in the role export plays in the general economy. Export accounts for 48.3 percent of the total GDP in Sweden, which is significantly higher than the world average of 29.5 percent (World bank, n.d.). In the U.S., export accounts for 12.6 percent of the total GDP (Ibid, n.d.). The importance of export in each economy differs widely and as such, it is reasonable to argue that investors in different economies find exposure to foreign economies of dissimilar importance. Thus, the choice of sample may be a reason for the divergence in results presented in this study and those in previous research.

However, the relatively small sample size used in this paper could also be an important factor. In the panel data setting, Li et al (2014) use a wide set of data consisting of 198,000 firm years while our data set consists of 500 firm years. A larger sample provides for more reliable results as standard errors decrease in sample size and the precision of the results increase.

Moreover, our data set consists of 50 of the most traded stocks on the Swedish stock exchange. This skews the sample to consist of export-heavy companies whose stocks are heavily monitored and whose pricing becomes efficient due to high frequent trading.

More, Mishra and Smyth (2017) find that mid capitalization stock prices in India contain a unit root. This implies that the mid capitalization segment is showing signs of weak efficiency, as discussed by Fama (1970), rather than mean reversion. The tests did not go further to test greater efficiency and as such it is uncertain if the mid capitalization segment incorporate all available information. An explanation for this phenomenon could be that investors expect this segment of stocks to be inefficient in pricing, and as such, they try to gain supra-normal returns. On the other hand, when a large number of investors pursue this tactic of speculative trading, the market becomes efficient and such abnormal returns are limited or non-existent.

Chapter 8
CONCLUSION

The results of this study are indefinite. We find evidence of a negative relationship between $exposure_{it}$ and stock returns. It is not likely that this information can be used to construct zero-investment strategies that generate abnormal returns. This is evidence of the fact that the link between information in geographical segment disclosures and stock returns is highly contextual, as discussed by Boatsman et al (1990).

One could argue that investors in Sweden may be aware of the exposure Swedish firms face and in trading on that knowledge the market effectively price in these exposures, making it impossible to gain abnormal returns. In the U.S. where export plays a much smaller role, investors underestimate the effect of foreign earnings as similarly noted in Thomas (2000), and in doing so abnormal returns are possible to achieve. This result imply that the Swedish stock market shows sign of semi-strong form efficiency as it has incorporated all historical data available when pricing the stock. This is logical, since the data retrieved on future economic growth is readily available before creating each portfolio it should follow that they are incorporated in the stock prices.

An area where this study could be improved is with the use of a larger sample, containing a wider variety of firms. This sample could provide the possibility of gaining abnormal returns, as these indices are likely to be less efficient than the large capitalization stocks. Further examining the role of export and its effect it has on this study, future research could include a sample of more countries whose economy is heavily reliant on export. This will help in determining whether abnormal returns are obtainable in such economies based on the $exposure_{it}$ measure or if in general, this is a valid approach.

A, to our knowledge, unexplored area of research is the disclosure of costs and how firms' cost exposure affect future stock returns. This would be an interesting study for future researchers to look into, should they be able to find such data.

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Appendix A
FORMULAS

The test statistic for the Chow-test is as follows:

$$F_{stat} = \frac{RSS_{pooled} - \sum RSS_{cs}}{\sum RSS_{cs}} \frac{T(N-K)}{K(T-1)} \tag{A.1}$$

which follows the F-distribution.

Calculation of market capitalization:

$$MarketCapitalization_{t-1} = P_{t-1}^{open} \#Shares \tag{A.2}$$

Calculation of stock returns, monthly and yearly:

$$R_t = \frac{P_t^{close} - P_{t-1}^{open}}{P_{t-1}^{open}} \tag{A.3}$$

$$R_t = \frac{P_t^{close} - P_{t-12}^{open}}{P_{t-12}^{open}} \tag{A.4}$$

Appendix B
TABLES AND FIGURES

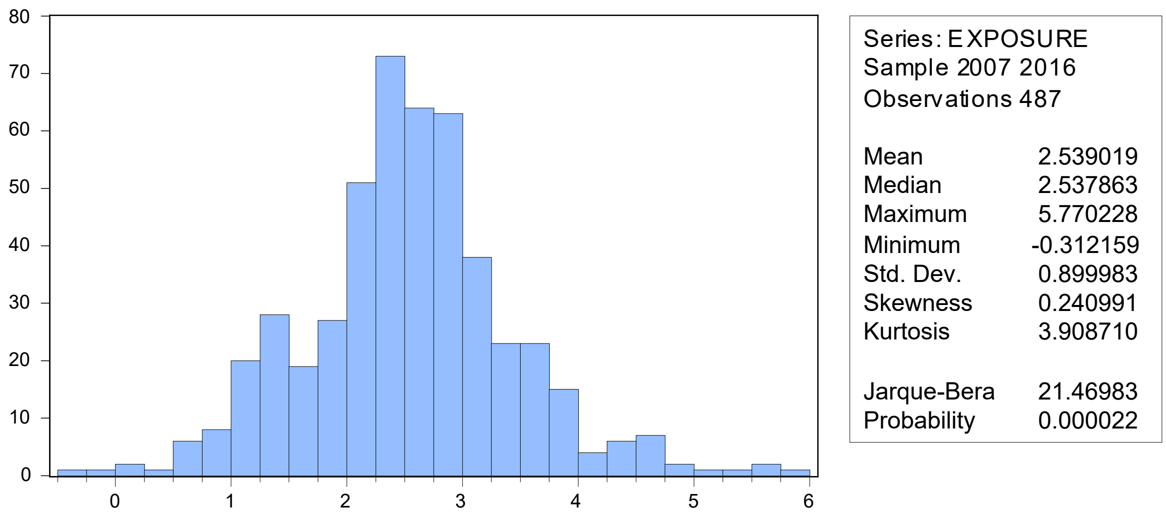

Figure B.1: Histogram of the $exposure_{it}$ variables

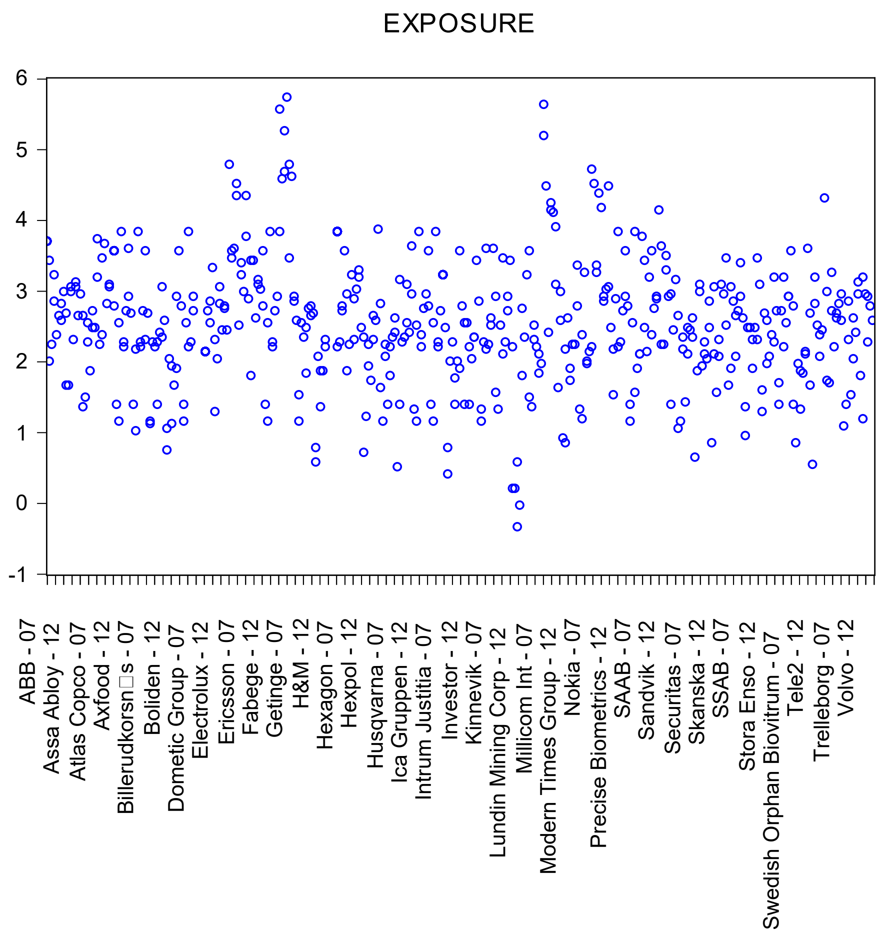

Figure B.2: Distribution of each company's $exposure_{it}$

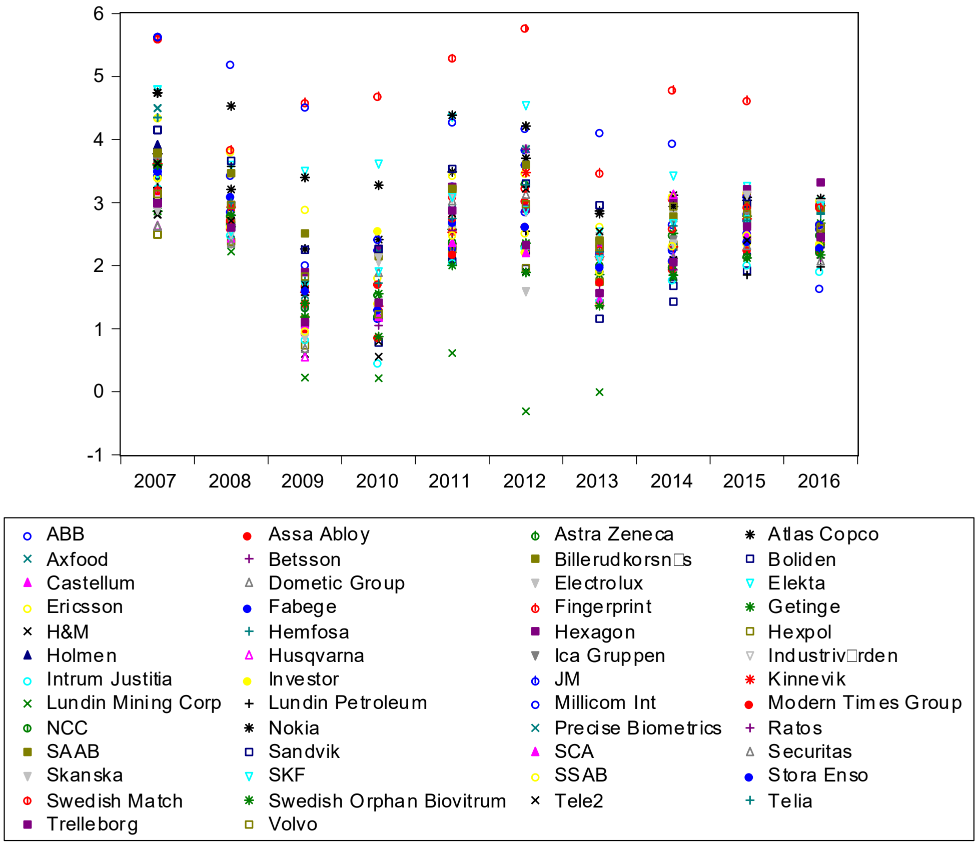

Figure B.3: Distribution of $exposure_{it}$ each year

Regional exposure:	$Sales_{2015}$	$E[Performance]_{2016}$	$Sales_{2015} * E[Performance]_{2016}$
North America	0.236	2.75	0.649
Latin America	0.086	0.60	0.052
India	0.054	7.46	0.403
Northern Europe & Central Asia	0.043	2.82	0.121
Western & Central Europe	0.08	1.70	0.136
Mediterranean	0.094	1.62	0.152
Middle East	0.093	3.51	0.326
Sub Saharan Africa	0.042	4.19	0.176
South East Asia & Oceania	0.079	4.10	0.323
Other	0.079	2.10	0.166
North East Asia	0.114	4.73	0.681
Sum:	1		$Exposure_{2016} = 3.185$

Table B.1: Calculation of $exposure_{it}$ for Ericsson 2016

Eq Name :	Eq 5	Eq 6	Eq 7	Eq 8
Dep. Var:	Return	Return	Return	Return
TQ	0.00		0.00	
	(0.01)		(0.00)	
	[0.72]		[1.07]	
SEK/USD	−0.00			
	(0.11)			
	[−0.00]			
$Exposure_{it}$	10.41	−8.76	0.83	10.32
	(16.33)	(5.48)	(16.37)	(14.73)
	[0.64]	[−1.60]	[0.05]	[0.70]
C		−0.06	−0.00	
		(0.03)	(0.04)	
		[−2.11] ∗∗	[−0.10]	
Inflation		4.32		0.13
		(1.56)		(0.96)
		[2.77]∗		[0.14]
MCap/SF		0.21		
		(0.06)		
		[3.75]∗		
Divpayout		−0.01		
		(0.02)		
		[−0.38]		
Earnyield			0.33	
			(0.35)	
			[0.96]	
P/BV				0.00
				(0.00)
				[0.76]
Observations:	435	411	415	479
R-squared:	0.01	0.18	0.25	0.01
F-statistic:	NA	1.66	2.36	NA

Table B.2: Regression results 2007-2016

$*** = p < 0.1$, $** = p < 0.05$, $* = p < 0.01$

Eq Name:	9	10	11	12
Dep. Var:	Return	Return	Return	Return
$Exposure_{i,t-1}$	17.40	−5.46	−5.24	−5.54
	(18.74)	(3.67)	(3.50)	(3.65)
	[0.93]	[−1.49]	[−1.50]	[−1.52]
P/CF	0.00			
	(0.00)			
	[1.36]			
SEK/USD	0.00	−0.14	−0.14	
	(0.12)	(0.04)	(0.03)	
	[0.03]	[−3.96] $**$	[−4.95] $**$	
Divpayout		−0.06	−0.05	
		(0.02)	(0.03)	
		[−2.83] $**$	[−2.17] $*$	
MCap/SF			0.03	0.04
			(0.02)	(0.02)
			[1.33]	[1.64]
TQ				0.00
				(0.00)
				[0.23]
Inflation				0.69
				(1.33)
				[0.52]
Divyield				−1.61
				(1.04)
				[−1.54]
Observations:	426	371	371	372
R-squared:	0.02	0.06	0.07	0.00

Table B.3: Regression results 2007-2016

$*** = p < 0.1$, $** = p < 0.05$, $* = p < 0.01$

	Mean	Median	Maximum	Minimum	Std. Dev.
Return	−0.0578	−0.0933	3.2870	−1.0475	0.4082
Divyield	−0.0003	−0.0017	0.1432	−0.0423	0.0201
Earnyield	−0.0008	−0.0265	0.7261	−0.1049	0.0960
$Exsposure_{it}$	−0.0001	−0.0010	0.0289	−0.0143	0.0057
Mcap/SF	−0.1326	−0.3892	4.8708	−1.3136	0.9847
P/BV	0.0766	−0.2426	203.1900	−83.3585	15.8651
P/E	−7.7197	−8.4730	151.5783	−36.9630	18.4430
P/CF	−1.3897	−1.9681	60.9019	−17.7238	7.4218
Divpayout	−0.0385	−0.16550	4.6966	−0.8534	0.6185
TQ	0.0973	−0.2785	226.3796	−93.5713	17.3383
SEK/USD	0.2124	0.1260	1.5760	−0.7132	0.6994
Inflation	0.0089	0.0089	0.0344	−0.0049	0.0127

Table B.4: Descriptive statistics during the period 2007-2016
for the demeaned variables

	Divpayout	Divyield	Earnyield	$Exsposure_{it}$	MCap/SF	P/BV	P/E	P/CF	Return	TQ	SEK/USD	Inflation	Repo
Divpayout	1.00												
Divyield	0.30	1.00											
Earnyield	−0.36	0.26	1.00										
$Exsposure_{it}$	−0.01	−0.20	−0.04	1.00									
MCap/SF	−0.01	−0.11	−0.21	−0.03	1.00								
P/BV	0.04	0.05	−0.04	0.02	0.15	1.00							
P/E	0.57	−0.19	−0.36	0.11	0.03	0.03	1.00						
P/CF	0.31	−0.21	−0.39	0.07	0.33	0.06	0.34	1.00					
Return	−0.16	−0.10	0.01	−0.13	0.06	0.01	−0.07	0.02	1.00				
TQ	0.04	0.06	−0.03	0.02	0.15	0.99	0.01	0.06	0.01	1.00			
SEK/USD	0.02	0.04	0.03	−0.01	−0.04	0.02	0.04	−0.15	−0.21	0.02	1.00		
Inflation	0.02	−0.00	−0.03	0.01	0.04	−0.00	−0.17	0.19	0.13	−0.01	−0.64	1.00	
Repo	0.05	0.02	0.00	−0.00	0.12	0.00	−0.09	0.13	0.15	0.00	−0.44	0.73	1.00

Table B.5: Correlation table of included variables

Table B.6: Unit root tests

Variable	P-value	First difference p-value
Divpayout	0.00	
Divyield	0.00	
Earnyield	0.00	
$Expsosure_{it}$	0.00	
Mcap/SF	0.00	
P/BV	0.00	
P/E	0.00	
P/CF	0.00	
TQ	0.00	
SEK/USD	0.99	0.00
GVB 10Y	0.62	0.00
SEK/USD Future	0.69	0.00
Inflation	0.00	
Repo	0.00	

Table B.7: Equality of Sharpe ratios

	$OMX60$	$Portfolio_i$	$Portfolio_{ii}$
Average excess return			
3M	0.0176	0,0054	-0,0094
6M	0.0048	0.0079	-0.0118
9M	0.0028	0.0036	-0.0075
12M	0.0046	0.0034	-0.0072
Standard deviation			
3M	0.0422	0.0554	0.0553
6M	0.0465	0.0550	0.0548
9M	0.0506	0.0519	0.0520
12M	0.0499	0.0509	0.0508
Sharpe ratio			
3M	0.4161	0.0978	-0.1708
6M	0.1035	0.1434	-0.2162
9M	0.0549	0.0694	-0.1446
12M	0.0922	0.0662	-0.1414

Table B.8: Company identifyer

Company	**Ticker**
ABB	ABB
Assa Abloy	ASSA
Astra Zeneca	AZN
Atlas Copco	ATCO
Axfood	AXFO
Betsson	BETS
Billerudkorsnäs	BILL
Boliden	BOL
Castellum	CAST
Dometic Group	DOM
Electrolux	ELUX
Elekta	EKTA
Ericsson	ERIC
Fabege	FABG
Fingerprint	FING
Getinge	GETI
H&M	HM
Hemfosa	HEMF
Hexagon	HEXA
Hexpol	HPOL
Holmen	HOLM
Husqvarna	HUSQ
ICA Gruppen	ICA
Industrivärden	INDU
Intrum Justitia	IJ
Investor	INVE
JM	JM
Kinnevik	KINV
Lundin Mining Corp	LUMI
Lundin Petroleum	LUPE
Millicom Int. Cellular	MIC
Modern Times Group	MTG
NCC	NCC
Nokia	NOKIA

Table B.8 – continued from previous page

Company	**Ticker**
Precise Biometrics	PREC
Ratos	RATO
SAAB	SAAB
Sandvik	SAND
SCA	SCA
Securitas	SECU
Skanska	SKA
SKF	SKF
SSAB	SSAB
Stora Enso	STE
Swedish Match	SWMA
Swedish Orphan Biovitrum	SOBI
Tele2	TEL2
Telia Company	TELIA
Trelleborg	TREL
Volvo	VOLV

Table B.9: Zero Hedge Portfolios for each year, () is for when the opposite position is taken in the stocks, based on our regression results where $exposure_{it}$ was negative, i.e. portfolio i

Year	**Long (Short)**	**Short (Long)**
2007	MIC	ASSA
	FING	MTG
	EKTA	TREL
	NOKIA	AZN
	PREC	SKA
	ERIC	GETI
	TELIA	HM
	SAND	HUSQ
	HOLM	SECU
	SAAB	HPOL
2008	ABB	MTG
	ATCO	SKF
	EKTA	PREC
	ERIC	SKA
	FING	IJ
	LUPE	HUSQ
	MIC	HPOL
	NOKIA	SECU
	SAAB	ELUX
	SAND	LUMI
2009	FING	SCA
	MIC	SSAB
	EKTA	MTG
	NOKIA	SKA
	ERIC	IJ
	SAAB	HPOL
	ATCO	SECU
	SAND	HM
	ABB	HUSQ
	HEXA	LUMI
2010	FING	ICA

Table B.9 – continued from previous page

Year	Long (Short)	Short (Long)
2010	EKTA	JM
	NOKIA	BETS
	INVE	MTG
	MIC	SOBI
	ATCO	HM
	HEXA	BOL
	SAND	TEL2
	ABB	IJ
	PREC	LUMI
2011	FING	JM
	NOKIA	HPOL
	EKTA	BETS
	MIC	MTG
	SAND	HM
	ATCO	HOLM
	ERIC	BOL
	ABB	IJ
	HEXA	SOBI
	VOLV	LUMI
2012	FING	JM
	EKTA	HPOL
	NOKIA	BETS
	MIC	MTG
	PREC	HM
	AXFO	HOLM
	CAST	BOL
	FABG	IJ
	HEXA	SOBI
	VOLV	LUMI
2013	MIC	TREL
	FING	SCA
	SAND	IJ
	NOKIA	HOLM
	ATCO	VOLV

Table B.9 – continued from previous page

Year	Long (Short)	Short (Long)
2013	ERIC	INVE
	EKTA	HM
	TEL2	SOBI
	ELUX	BOL
	ABB	LUMI
2014	FING	NCC
	MIC	MTG
	EKTA	RATO
	HUSQ	HM
	ATCO	SOBI
	ERIC	HOLM
	ASSA	LUMI
	HEXA	IJ
	VOLV	BOL
	NOKIA	SAND
2015	FING	SECU
	EKTA	MTG
	HEXA	HOLM
	ERIC	HM
	ASSA	NCC
	SKA	TELIA
	MIC	RATO
	ATCO	IJ
	NOKIA	BOL
	SAND	LUPE
2016	HEXA	HM
	NOKIA	STE
	ERIC	MTG
	EKTA	NCC
	SKA	SOBI
	ICA	RATO
	FING	SECU
	SKF	LUPE
	PREC	IJ

Table B.9 – continued from previous page

Year	Long (Short)	Short (Long)
2016	AXFO	MIC