UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Finance

How does the Gender Composition of Corporate Boards affect the Risk-Adjusted Performance of Large Swedish Firms?

Carl Johan Svensson

Supervisor: Sara Lundqvist
Master Degree Project No. 2016:165
Graduate School

Abstract

This master thesis examines the effects of the gender composition of the board of directors of companies within the Swedish OMX Large Cap index, on risk-adjusted and unadjusted performance measures. Furthermore, the relationship between the gender composition and the level of systematic risk is analysed, crystallized in terms of the firm beta values. Both Ordinary Least Squares (OLS) and time-series specifications are utilized. For both risk-adjusted and unadjusted measures, no significant relationship was found, when using the standard five percent significance level. For the beta values, a negative relationship was found in the OLS setting. Here an increase of the share of females with one percentage point implied a reduction of the beta value by .0024. No relationship was found in the time series specification. Firms with a higher share of women thus displayed a lower level of systematic risk, but when looking at the individual businesses, no causal link between an increase of female representation and systematic risk could be stated. In short, gender was not found to be a predictor for risk or performance.

Keywords: Gender, Board of Directors, Risk-Adjusted Performance, Corporate Governance

Table of Contents

1. Introduction.....3

2. Literature review.....6

2.1 Theoretical Frameworks.....6

2.1.1 Agency Theory.....6

2.1.2 Resource Dependence Theory.....7

2.1.3 Human Capital Theory.....7

2.1.4 Social Psychology Theory.....8

2.1.5 Summary of the Theoretical Aspects.....8

2.2 Empirical Literature.....8

2.2.1 Gender and Performance.....8

2.2.2 Gender and Risk-Aversion.....10

2.2.3 Summary of the Literature Review.....11

3. Hypotheses.....11

4. Methodology.....12

5. Data.....14

6. Empirical Results.....17

6.1 Return on Assets.....18

6.2 Tobin's Q.....19

6.3 Jensen's Alpha.....20

6.4 Fama French Alpha.....22

6.5 Beta.....22

7. Analysis.....23

8. Conclusion.....24

9. References.....26

10. Appendix.....30

1. Introduction

The board of directors of corporations is sometimes considered an exception when looking at the broader picture of equality between the sexes. In areas where women's liberation is old news, the boards still often display a skewed composition, with an over-representation of male directors.

However, the general trend of the level of female representation is an increasing one. Within the European Union, the share of women in corporate boards increased from 9% to 19% between 2003 and 2014. For Sweden, the corresponding values for the period is an increase from 18% to 27%.

Several countries have used regulatory measures in order to increase the representation of women in corporate boards. The pioneer in this aspect was Norway, where a law demanding a mandatory quota of 40% was introduced in 2006. A number of countries within Europe have followed, with levels of requirement spanning from 30% to 40% (Nannesson 2014).

Though Sweden has not followed in terms of regulatory requirements, the question has been debated, and the situation may be altered in the near future. In 2014, following a period characterized by a low level of change, Sweden's former centre-right minister of finance Anders Borg stated that forced quotas were a possible future means, given that the situation did not change (Svenska Dagbladet 2014). The same year, representatives of the green party and the social democrats stated that measures would be taken, if the average composition did not reach 40% until 2016 (Sveriges Radio 2014). According to Sweden's minister of equality Åsa Regner, a social democrat, the promise will stand, and there will be a legal requirement quota carried out if the current composition of 27,5% does not reach 40% during the year (Dagens Nyheter 2016). The statement met criticism of from columnist Alice Teodorescu of the liberal newspaper Göteborgsposten (Göteborgsposten 2016).

As a result of the prior lack of regulation, the reasons for electing female representatives in Swedish firms have been voluntary. And this is something that has been shown to alter the effects on performance. Changes that are a result of the voluntary decisions of the board, as opposed to regulatory quotas, have been shown to have a positive effect on performance globally, when changes due to the different reasons were analysed by Labelle, Francoeur & Lakhal (2015).

Studies have long displayed a higher level of risk-aversion among women, and Adams & Ferreira (2009) found a negative relationship between the volatility and female representation on the board of directors, when analysing firm years with and without female representation. Though, some evidence has suggested that the opposite relationship may hold for board members. A study by Adams & Funk (2012) found that female officers in Sweden displayed a lower level of risk aversion.

Thus various research papers have indicated both that the attitude towards risk differs between the genders, on a statistical basis, and that there is a statistical difference between the

risk level in firms with different levels of female representation. The findings are not completely one-sided, but regardless of sign, a difference in the risk aspect would affect the businesses' attractiveness for investors. Since the value of any security is determined by its risk and return, this could indicate that measures neglecting the risk factor might fail to fully assess whether shareholder value is created, destroyed or unchanged, when the composition is altered.

Guided by these insights, this master thesis will look at the effect of the gender composition of the board of directors of large Swedish firms, measured in percentages of female representation, on a number of performance measures in general and risk-adjusted performance in particular. Furthermore, in order to complete the picture, regressions on the beta value, the systematic risk, are conducted as well.

A large number of aspects have been shed light on by previous literature, including both accounting measures such as Return on Assets (RoA) and metrics of market values such as Tobin's Q. But still, the relationship between risk-adjusted performance and the gender composition of the board of individual firms, to my knowledge, lacks an equivalent level of mapping. There is some evidence being provided, such as the article by Francoeur et al (2008), which found positive abnormal returns for companies with a high proportion of women within Canadian businesses, when operating in a complex environment. But the bulk of the observations lacks the risk dimension, and though various approaches regarding the statistical methodology have been utilised, the same diversity does not appear to present itself in the choice of performance measures. Taking the risk aspect into account can thus broaden the existing picture, and further elucidate what types of effects are present within this context.

Furthermore, regressing the risk-adjusted and unadjusted measures in parallel can display whether the inclusion of the risk dimension alters the nature of the findings, or whether the different findings tend to match. If the performance is affected by gender in a risk-adjusted setting, but unaltered or changed in an unadjusted sense, or vice versa, this can illustrate how the risk factor affects performance.

Analysing the Swedish market is of value, since it is an area in which the debate of whether or whether not to demand a quota is present, and where such a measure possibly is to be carried out in the near future. This implies that a robust mapping of the consequences, from a wide set of perspectives, can provide guidance. Due to the current lack of such regulations, the analysis will represent changes based upon voluntary choices by those electing the members of the board.

The findings can be of value for investors in general, and the subset of investors with an interest in perspectives beyond risk and return, such as Environmental, Social and Governance (ESG) issues, in particular. Furthermore, the findings can be of use for shareholders appointing the board of directors and government bodies examining the effects of gender diversity in a voluntary setting.

The main measure utilized in this thesis is ex post Jensen's alpha, introduced by Jensen (1967). This value measures the performance of a security, or a portfolio of securities, compared to the value predicted by the Capital Asset Pricing Model (CAPM). Though introduced as a test of market efficiency and fund performance, the alpha model has been utilised for determining ex post risk-adjusted performance of single securities (Damodaran, 2011). Time-series regressions using Jensen's alpha have been conducted in previous research, when analysing the effects of other firm-specific traits, such as working capital (Shin & Soenen, 1998).

Moreover, alpha estimations are carried out using excess returns of the The Fama French three-factor model, thus controlling for firm size and the price to earnings ratio in addition to the market return. This measure has been used in a gender-related context by Francoeur et al (2008).

Much like the article by Jensen (1967) provided evidence of market efficiency, using risk-adjusted performance measures implies that the analysis will test the efficiency of the market. Given that the market is efficient, there should be no arbitrage opportunities left that are unexploited. If the Efficient Market Hypothesis (EMH) holds, the market reflects all relevant information available to investors, and the securities of the market, as a result, are priced correctly. Given that the securities are correctly priced, one would thus not be able to systematically generate excess return, in the sense that they do not carry a penalty in the form of some factor of systematic risk. Investing in firms of any particular character should thus not yield returns over and above those that can be explained by the set of risk factors. In this particular setting this implies that if the market is efficient, the gender composition should not have any significant effect on the alpha value. As illustrated by Jensen (1967) market efficiency does not necessarily imply an absence of risk-adjusted performance, but rather a non-systematic nature of such performance.

To further analyse the effects on performance and compare to the results of previous studies, the effects on Tobin's Q and RoA are regressed as well.

To control for firm specific characteristics, firm Fixed Effects (FE) time series regressions are carried out when regressing RoA and Tobin's Q. The use of a firm FE estimator is consistent with the methodology of Bøhren & Strøm (2010), Adams & Ferreira (2009) and Reguera-Alvarado et al (2015). For the alpha values, the choice of estimator is determined using a Hausman test. If the time-invariant component is statistically significant, this suggests the use of a FE estimator, while insignificance suggests the use of a Random Effects (RE) estimator (Roberts & Whited, 2012). In addition to the time-series specifications, Ordinary Least Squares (OLS) regressions are conducted, in order to enable a comparison to the case when these characteristics are not taken into account, as done by Adams & Ferreira (2009). Furthermore, by not taking these factors into account, the OLS displays the relationship when it is assumed that the choice is exogenous, which is the case for outside investors deciding

whether or not to invest in a specific security. For this group the OLS can thus be of value as a complementary measure.

The purpose of this analysis is to investigate the business case for female board representation, and to map the creation of value from the shareholder approach. Thus is takes the viewpoint that the purpose of an enterprise is to create value for its shareholders, crystallized in terms of the various financial measures, and that the business case under investigation is how these measures are affected by altering the gender composition of the board. Other perspectives, while valuable, lie beyond the scope of this thesis.

2. Literature review

2.1 Theoretical Frameworks

The ideas of gender-related topics are interdisciplinary, with several theories and empirical approaches. Thus the various perspectives are dealt with one by one, and theoretical frameworks and empirical evidence are presented separately.

Firstly, when looking at the effects of any factor related to the board of directors, it is important to state what the role of the board is, in order to analyse the effects on any of these factors. One commonly used categorization divides the tasks of the board into four main areas; monitoring and control, provision of information and counselling, monitoring legal compliance, and connecting the firm to external actors in its environment (Carter et al, 2010).

Furthermore, the different viewpoints on the subject of the gender composition are more of a patchwork rather than a central theory. There are contributions from several disciplines, spanning from economics to organization theory to social psychology. The common areas of analysis will be presented and their respective points of view will be talked about separately.

2.1.1 Agency Theory

Agency Theory focuses on the goals of the principal and the incentives of the agent, and analyses the consequences when these do not perfectly align (Jensen & Meckling, 1976). When looking at the question of diversity, it has been argued that a higher degree of gender diversity can have a positive effect on board independence. A more heterogeneous group of agents would then in turn increase the level of monitoring and control.

However, in terms of critique of the diversity aspect of this approach, it has been argued that this effect might be of lesser importance compared to more direct incentive alignments, such as a higher equity stake among board members (Carter et al, 2012). Furthermore, the link between monitoring and performance is not straightforward, since too high a degree of monitoring can have a negative effect on the performance of well-managed firms (Adams & Ferreira, 2009).

Thus Agency Theory does with certainty suggest any specific nature of the relationship between diversity and performance. But it does suggest that certain traits are relevant when looking at the relationship between principal and agent, and evidence shows that such tend to be correlated with gender.

2.1.2 Resource Dependence Theory

Resource Dependence Theory focuses on the connections between the company and its environment, and how board members with connections to outside actors can provide value to a firm. It has been found, among other things, that having a commercial banker as a member of the board is positively correlated to leverage (Booth & Deli, 2009). This is explained by the links to the debt market provided by such board members. When looking at gender through the scope of the Resource Dependence Theory, Hillman, Shropshire & Cannella (2007) found, among other things, that links to boards with female representation had had a positive effect on the probability of the firms having women on the board.

Though not explicitly stated, the effect of female board representation on performance would be expected to be positive in this theoretical setting, since a more spread set of characteristics would imply a higher amount of links to valuable resources. If there are links to resources where women are overrepresented, female directors could provide value by connecting the firm to such resources.

2.1.3 Human Capital Theory

Human Capital Theory states that that individuals and groups with certain characteristics can have unique traits that might in turn provide benefits for the company. Though there are several similarities, the theory differs from Resource Dependence Theory in the sense that it focuses on intrinsic abilities, rather than the links to outside actors (Carter et al, 2010).

One question that has been asked in this theoretical context is whether there is, statistically, a potential lack of human capital among females in the areas relevant to the role of board membership. When looking at the findings related to this subject, there is evidence that women are as qualified as men when looking at a large number of metrics, such as level of education. However, it has been found that females tend to be under-represented in terms of experience as business experts. Women were less likely to have experience as Chief Executive Officer (CEO) or Chief Operating Officer (COO), but more likely to hold a Master of Business Administration (MBA) degree (Singh, Terjesen & Vinnicombe, 2008).

Due to the mixed results, the Human Capital Theory does not strictly imply a certain type of relationship between diversity and performance. As the clustering of some traits with regards to gender speak for and some against a higher performance, there is no clear expectation of the effects.

2.1.4 Social Psychology Theory

Social Psychology Theory indicates that there can be obstacles to the perceived idea of a direct relationship between a more diverse board and more diverse ideas being implemented. Findings within the field of psychology suggest that the majority tends to exercise a disproportionately large influence on the decisions made. This might reduce the value of ideas stemming from a more diverse board of directors (Westphal & Milton 2000). Campbell & Mingues-Vera (2008) suggest that even when a successful implementation of a more diverse spectrum of ideas has been carried out, this may lead to a more time-consuming process when making decisions, which might in turn affect performance negatively.

Overall, the prediction of the relationship between the gender composition and performance is not straightforward, but the findings tend to emphasise the potential downsides of diversity that can result from phenomena related to group psychology.

2.1.5 Summary of the Theoretical Aspects

The theories on gender diversity tend to exhibit a wide array of predicted effects. Agency Theory and Human Capital Theory show that effects can depend on the circumstances. The Resource Dependence Theory mainly shows support for a higher share of women, since any form of diversity has the ability to provide links to resources. Meanwhile, The aspects of Social Psychology Theory mainly shed light on potential problems and obstacles, which might hinder the potential benefits, and even cause negative effects, such as a less efficient decision making.

2.2 Empirical Literature

Analyses of the link between risk aversion and the the effects of gender on performance have been carried out with several approaches and methodologies around the globe.

2.2.1 Gender and Performance

When analysing companies of small, large and medium size from the Standard & Poor's (S&P) indices within the United States, Adams & Ferreira (2009) find, among other things, that a higher fraction of female board directors has had a negative effect on performance measures such as RoA and Tobin's Q. Based upon a systematic difference between the genders, where women tend to be stricter monitors, the authors argue that the impact on the board can differ between companies of different quality of government. The authors put forward the idea that well-managed firms face disadvantages from a higher female representation, since stricter monitors can be counter-productive for well-managed firms, while it can have a positive effect on badly managed firms. This view is consistent with the views presented by the Agency Theory. Worth noticing is than an OLS setting showed a positive relationship, indicating systematic differences between businesses with a high share of female directors and those with a lower share. Overall, the authors argue that performance

cannot be used to motivate gender quotas and that such quotas can reduce the value of companies that are governed well.

Regarding risk adjusted return, Francoeur et al (2008) find that, when operating in a complex environment, firms tend to draw some advantages from a higher share of female officers, as the subset with a high representation of female officers has a level of abnormal monthly returns of 0.17% percent. Other factors, such as the representation of female directors, did not show any significant relationship to the performance.

Haslam et al (2010) found that that objective financials such as accounting measures were unaffected by gender, while more subjective values such as stock returns displayed a negative relationship to a having females on the board. The analysis was concerned with stocks within Britain. This evidence thus suggests that investors might undervalue firms with female representation, and that such an undervaluation has no basis in the actual objective performance of the company.

Further evidence from the Financial Times Stock Exchange (FTSE) 100 index in London is provided by McCann & Wheeler (2011). Their findings do not show support for the business case for diversity. The authors thus argue that in order to advocate for gender diversity, a social justice argument would be a more fitting methodology.

In a panel data regression analysis, Campbell & Mingues-Vera (2008) found that gender diversity has had a positive effect on performance in Spanish firms, when using the share of female representation and two diversity indices as explanatory variables. Reguera-Alvarado et al (2015) reached similar conclusions for Spain when looking at the effect of a quota legislation on performance.

When analysing the American market, Carter et al (2010) found no significant effect, when looking at diversity in terms of gender and ethnicity and financial performance. The authors conclude that the relationship may depend on more specific circumstances and that a single type of relationship between diversity and performance is a too simplistic way of looking at reality. Within the European market, Babalos, Caporale & Philippas (2015) found differences in neither performance nor risk between funds with male or female managers.

Looking at the subject from an international perspective, Labelle, Francoeur & Lakhal (2015) found that the relationship between female representation and performance on average was positive in countries where changes have occurred on a voluntary basis, but negative in countries that have adopted a regulatory quota. Bases upon this evidence, the authors suggest that this type of change should be carried out gradually and on a voluntary basis rather than by the means of legal coercion. Another implication of these findings is that the cause for changes in the gender composition ought to be stated when analysing the effects, since results may vary depending on whether the changes were the results of legal requirements or not.

In the Scandinavian context, Rose (2007) found no evidence of any relationship between female board representation and performance in Denmark.

In Norway, where the first mandatory quota was carried out, Nygaard (2011) found that the quota has had a positive significant effect on abnormal returns for firms with a low level of information asymmetry, and a negative, but insignificant, effect on firms with a high level of information asymmetry. Bøhren & Strøm (2010) found a negative relationship between gender diversity and shareholder value for non-financial companies. Furthermore, Ahern & Dittmar (2012) found a negative market response to the announcement of the mandatory quota and a reduction in Tobin's Q for the years following the announcement.

In Sweden, Daunfeldt & Rudholm (2012) found a negative relationship between gender diversity and ROA, when analysing the performance of Swedish firms between 1997 and 2015.

In an American context, Hillman, Shropshire & Cannella (2007) investigated which firms were more likely to have female representation on the board and found that size, sector, strategy for diversification and network effects have had a significant impact on the probability.

Thus the evidence shows no clear one-sided picture of the relationship. The finding differ depending on region, time-frame, statistical methodology, and the cause for the change. Examinations of whether the publication of the articles suffers from publication bias where certain findings, such as those with significant results, more easily get published, lies beyond the scope of this thesis.

2.2.2 Gender and Risk-Aversion

Evidence has shown that women tend to display a more risk-averse behaviour. When conducting experiments where participants were given choices between monetary rewards with various degrees of riskiness, it has been shown by Borghans et al (2009) that women on average tend to choose less risky alternatives. Furthermore, women were less likely to choose ambiguous returns, i.e. returns where the very distribution is unknown. These results are consistent with previous finding by Hartog et al (2002) and Agnew et al (2008).

Huang & Kisgen (2012) found that male executives tend to display a higher level of overconfidence compared to their female counterparts. The differences in behaviour were measured in terms of propensity to exercise stock options early and announcement returns of acquisitions and debt offerings.

Still, some aspects of the matter are debated, and Adams & Funk (2012) found that female directors in Sweden were less risk-averse than their male counterparts. In their paper, a survey was sent to the directors of Swedish companies, where the participants answered numerous questions. The survey included monetary choices with different risk-return profiles, such as lotteries where the expected value of participation was higher than the

expected return of not participating. The results are explained by the concept of female board members being strongly skewed in behaviour compared to the general female population, since women with certain characteristics are disproportionately likely to become board members. The evidence thus suggests that differences in preference regarding risk-aversion is one of the traits that increases the chances for women to be elected as board members.

However, in the paper by Adams & Ferreira (2009) it was found that there was a lower volatility in the stock returns for firm years where the company had female representation in the board. Here the authors compared the sample of all individual years for all companies with and without women in the board of directors.

2.3 Summary of the Literature Review

Both the theoretical frameworks and empirical findings tend to display varying results. The theoretical aspects differ mainly due to the differences in the scope of analysis, making the predicted results change when one specific area is emphasised. In the empirical work, factors such as the underlying cause of changes in gender composition, the nature of the business, and which statistical method was utilized, tend to lead to results that do not show a single clear picture of the nature of the relationship. When looking at the question of risk-aversion most evidence suggests a higher level among females, but the evidence for the Swedish officer case in particular indicates the opposite.

3. Hypotheses

Based upon the previous findings, there is no straight-forward answer to the question of the expected signs of the regressors. Given the contradictory nature of previous empirical results, where findings differ greatly, a single clear picture of the reality is not being presented. However, some evidence has pointed out the systematic difference between firms carrying out voluntary changed opposed to changes forced by regulation. Since Sweden has been an example of the former, the hypothesis for RoA, Tobin's Q and the alpha values is thus that there is a positive, significant relationship between the gender composition and the performance measure. This prediction is in line with the Resource Dependence Theory, suggesting that opening up to a more diverse set of board members will provide links to valuable resources.

Hypothesis I: There is a positive, significant relationship between the gender composition and the ROA values of the firms.

Hypothesis II: There is a positive, significant relationship between the gender composition and the Tobin's Q measures of the firms.

Hypothesis III: There is a positive, significant relationship between the gender composition and the alpha values of the firms.

When looking at the beta value, the aspect of risk comes into play. Though most evidence in general has suggested a higher risk-aversion among females, the Swedish evidence in particular has suggested a lower risk-aversion for this group, explained by an adverse selection. Thus the hypothesis is that increasing female representation increases the systematic risk of the company..

Hypothesis IV: There is a positive, significant relationship between the gender composition and the beta values of the firms.

4. Methodology

The goal of this paper is to examine the effects of the gender composition of the board within individual firms. Since the act of appointing directors is done by the shareholders of the companies, the selection in non-random. The shareholders of companies electing a higher share of women might display unobservable characteristics that also affect performance. Thus, in order to control for such firm-specific characteristics, a firm FE estimator is utilized for RoA and Tobin's Q, as done by Bøhren & Strøm (2010), Adams & Ferreira (2009) and Reguera-Alvarado et al (2015). When looking at the alpha values, the advice of Roberts & Whited (2012) is followed, where a Hausman test is used in order to determine the choice between a random and fixed effects estimator. For regressions with a significant time constant component the latter is suggested, while the former is suggested for cases where no time constant component is present. The Hausman test is also conducted for the RoA, Tobin's Q and the beta values, in order to ensure that the methodology is valid.

In order to compare to the case when these firm-specific characteristics are not controlled for, OLS regressions are carried out as well. The OLS shows the relationship when it is assumed that the choice of directors is exogenous. Due to this, the OLS regression can be of value, as a complementary regression for outside financiers making investment decisions, since unobserved characteristics correlated to gender can provide insights, given that such factors affect performance.

The main measure used is Jensen's alpha, displaying the return in relationship to the return predicted by the CAPM. The Jensen's alpha values for each firm year are regressed by taking the daily returns of the specific firm during the year in question, and deducting the beta value times the market return, and the risk free rate, in a manner similar to that of Bello (2005).

$$R_{it} - R_{ft} = \beta_i * (R_{mt} - R_{ft}) + \alpha_i + e_{it}$$

Once the values have been estimated in this way, regressions on the firm year Jensen's alpha values are conducted in the OLS and FE specifications. For these regressions, the daily alphas values are transformed into annual alphas by multiplying the values by 250, as an approximation for the number of trading days on a single year. This approach is analogous to that of Lewellen & Nagel (2006).

The market return is proxied by the return of the OMX large cap index, in order to best suit the sample in question. The risk free rate is proxied by the return of three month treasury bills, issued by the Swedish Government, following the methodology of Francoeur et al (2008)

When regressing the Fama French alpha values, the firms are categorized into six different groups based upon size and the book to market ratio, as done by Gaunt (2004). When looking at size, companies are separated into the lower and upper 50%. With regards to the book to market ratio, firms are separated into one group including the lower 30%, one including the middle 40% and one including the upper 30%. The separation is carried out using the values of the end of the year, as done by Gaunt (2004).

The size factor Small Minus Big (SMB) is calculated by taking the daily returns of a long position in the three groups with a low level of market capitalisation and a short position in the three groups with a high level of market capitalisation.

$$SMB_t = \Sigma R_{Small\ t} - R_{Big\ t}$$

The book to market factor High Minus Low (HML) is calculated by taking the daily returns of a long position in the two groups with a high ratio and a short position in the two groups with a low ratio.

$$HML_t = \Sigma R_{High\ t} - R_{Low\ t}$$

The Fama French Three-Factor alpha values for each firm year are regressed by taking the daily returns based upon the three risk factors and the risk free rate, for the year and company in question.

$$R_{it} - R_{ft} = \beta 1_i * (R_{mt} - R_{ft}) + \beta 2 * SMB_t + \beta 3 * HML_t + \alpha_i + e_{it}$$

As with the Jensen's alpha values, the firm year Fama French alpha values are regressed in the OLS and FE specification once estimated. Similar to the case of the Jensen's alpha values, the daily Fama French alpha values are transformed into annual alphas by multiplying the values by 250.

Following the methodology of Adams & Ferreira (2009) the Tobin's Q value for the specific firm year is proxied by taking the market value of the company divided by the book value.

$$Tobin's\ Q = Firm\ Market\ Value\ /\ Firm\ Book\ Value$$

The market value of the firm year is calculated by taking the book value of the company, deducting the book value of equity, and adding the market value of equity.

$$Firm\ Market\ Value = Firm\ Book\ Value - Book\ Value\ of\ Equity + Market\ Value\ of\ Equity$$

Once generated, the firm year Tobin's Q values are regressed in the OLS and FE specifications.

The Beta values are calculated by taking the estimated covariance of the return of the firm and the market, divided by the variance of the market return. Annual values for the individual businesses are estimated using the daily returns.

$$\beta = Cov(R_i\ R_m) / Var\ (R_m)$$

Once estimated in this manner, regressions on the firm year beta values are conducted in the OLS and RE specifications.

In order to isolate the effect of the gender composition, various control variables are utilized. Control variables for the number of board members, the number of business segments and the sales are used for this purpose. For the latter, a logarithmic transformation is used, since the logarithmic distribution is better approximated by a normal distribution, compared to the absolute values.

The control variables thus adjust the results with regard to characteristics of both the board in itself and factors more related to the firm as a whole. By using the set of controls for such characteristics, the risk of bias due to omitted variables is reduced. The controls variables, and the logarithmic transformation of the sales figures, are in line with the methodology used by Adams & Ferreira (2009). Due to an absence of sufficient data available for Swedish firms, a control variable for the fraction of independent directors could not be included.

5. Data

The sample consists of 56 OMX companies from the Large Cap index between the years 2006 and 2015. Due to the cleaning of the data and the absence of data available for a number of control variables, a small number of firm years were excluded from the respective regressions. Except for these missing observations, the companies are kept for the whole period, and the data is thus strongly balanced. One advantage of a more balanced panel data is that missing observations of a systematic nature are less likely (Vorbeek, 2012). Baquero et al (2005), have shown that analyses of hedge funds using unbalanced panel data can lead to faulty conclusions, if bankruptcies cause non-random missing observations. Analogous to this example, firms systematically dropping out of the index in question could have lead to a bias, had an unbalanced panel data set been used.

The sample captures a large bulk of the increase in female representation in Sweden, and it represents firms that play a large role in the Swedish economy. Furthermore, some evidence has indicated that women are more likely to sit in the board of larger businesses (Hillman,

Shropshire & Cannella, 2007). Thus the effects of the change can potentially be more clearly mapped in a setting where firms of larger size are the ones being analysed.

One implication of using a sample of larger firms is that the companies tends to have a lower risk of bankruptcy, both in general (Ohlson, 1980), and in Sweden in particular (Giordani et al, 2011). Since the systematic nature of omissions such as those caused by bankruptcies may cause a bias when using an FE estimator (Vorbeek, 2012), using a large cap sample implies a lower risk of suffering from this type of bias.

One drawback of using larger businesses only is that the effects of gender in smaller firms remains unanalysed. The effects regarding those companies thus lie beyond the scope of this thesis.

Data on the risk free rate of return, the index return and stock performance have been collected from Datastream. Data on the composition and size of corporate boards have been collected from *Styrelser och Revisorer i Sveriges Börsföretag* by SIS Ägarservice. Data on business segments, accounting measures and market values have been collected from Bloomberg. The market return is proxied by the OMX large cap index, and the risk free rate is proxied by the return of a Swedish three month government treasury bill.

Average Share of Female Directors									
2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20.2%	20.2%	22.5%	23.0%	26.3%	27.0%	26.6%	28.4%	30.8%	32.9%

Table 1: Annual average share of female directors within the sample.

When analysing the development for the sample, the gender composition has gone from 20.2% female to 32.9%, implying an increase by 12.7 percentage points during the period. This is consistent with the general trend found in Sweden and other European countries. The growth has been mainly gradual, though some individual years display higher changes.

Variable	Mean	Std	Min	Max
RoA	6.972 %	9.338 %	-56.94 %	68.38 %
Tobin's Q	1.849	1.573	.6117	19.97
FF alpha	.00016	.00094	-.0038	.0053
Jensen's alpha	.00022	.0012	-.0053	.0113
Members	7.814	1.645	2	16
Beta	.8760	.3116	-.2908	1.982
Share of Women	25.80 %	11.87 %	0 %	60 %
Log (sales)	9.489	1.746	2.330	12.65
Segments	5.238	3.687	1	31

Table 2: Descriptive statistics for the variables.

A number of observations can be made regarding the data. When looking at all the years for all the firms, the average share of women is 25.8%, The RoA values display an average of 6.972. The average Tobin's Q value is 1.859. The corporate boards are of quite varying size, spanning from 2 to 16 members, with an average of 7.814. The average Fama French alpha is .016% and the average Jensen's alpha is .022%. The average beta of the sample is .876, implying that she sample shows a slightly lower systematic risk compared to the index. Regarding the log of the sales, the average value is 9.489. There is a wide range in the number of business segments, spanning from one single segment to 31. The average is 5.238.

Correlation matrix									
	ROA	*Tobin's Q*	*FF alpha*	*J alpha*	*Members*	*Beta*	*% Women*	*Log (sales)*	*Segments*
RoA	1								
Tobin's Q	.5421	1							
FF alpha	.1802	.1170	1						
J alpha	.2619	.3986	.8097	1					
Members	.0145	-.1854	-.0620	-.1590	1				
Beta	-.0318	-.1010	.0076	-.0746	.2552	1			
% Women	.0991	-0.0105	.0643	.0044	.0312	-.0457	1		
Log (sales)	.01914	-.0850	-.0706	-.1557	.5659	.3651	.1288	1	
Segments	-.0782	-.1370	-.1056	-.1173	.2069	.2281	.0759	.3698	1

Table 3: Correlation coefficient between the variables.

When looking at the correlation matrix a number of statements can be made. The performance measures tend to display a positive correlation. The alpha values show a strong correlation, approximately .810, which should be expected given that one is essentially a modification of the other. Furthermore, the unadjusted measures RoA and Tobin's Q show a relatively high correlation, about .542. The risk-adjusted and unadjusted measures show a positive, but relatively low level of correlation, spanning from approximately .180 to .400. and Firms within the sample show a negative correlation between the share of women and the beta value, indicating a lower level of risk. However, the correlation coefficient is weak, approximately -.046.

6. Empirical Results

Regressions are conducted for Return on Assets, Tobin's Q, Jensen's alpha, the Fama French three factor alpha, and the beta values. Both Ordinary Least Squares and time-series specifications are utilized.

6.1 Return on Assets

Independent Variable	**Dependent Variable: Return on Assets**	
Percent of Women	.0558*	-.0661*
	(1.80)	*(-1.93)*
Board Size	-.7219***	-.2618
	(-2.67)	*(-.88)*
Business Segments	-.4158***	-.2648
	(-3.94)	*(-1.41)*
Log of Sales	1.629***	3.835***
	(6.06)	*(7.17)*
Constant	-1.784	-23.94***
	(-.44)	(-5.00)
F-statistic	8.59	13.53
R-squared	.0809	.0434
Regression Type:	OLS	FE

Table 4: regression results for Return on Assets. The values of the t-statistics are displayed within the brackets. The stars indicate the statistical significance of the coefficients, indicating a .01(***), .05(**) or .1(*) significance level. In the Fixed Effects specification, the R-squared displays the overall significance level.

In the OLS setting for RoA, women's share of the board was found to have a positive effect, significant at the 10 percent significance level. In this estimation, increasing the share of female directors by one percentage point increased the RoA value by approximately .0558 percentage points.

In the FE setting, where individual characteristics of the firms are controlled for, women's share of the board was found to have a negative effect, significant at the ten percent significance level. An increase by one percentage point decreased the RoA value by approximately .066 percentage points.

6.2 Tobin's Q

Independent Variable	**Dependent Variable: Tobin's Q**	
Percent of Women	-.00061	- .00046
	(-0.11)	*(0.09)*
Board Size	-.1969***	-.0062
	(-3.96)	*(-0.14)*
Business Segments	-.0524***	-.0515*
	(-2.71)	*(-1.82)*
Log of Sales	.0689	.5078***
	(1.40)	*(6.30)*
Constant	3.048***	-2.633***
	(7.41)	*(-.59)*
F-statistic	6.77	11.5
R-squared	.0480	.0033
Regression Type:	OLS	FE

Table 5: regression results for Tobin's Q. The values of the t-statistics are displayed within the brackets. The stars indicate the statistical significance of the coefficients, indicating a .01(***), .05(**) or .1(*) significance level. In the Fixed Effects specification, the R-squared displays the overall significance level.

When looking at the Tobin's Q values, both the OLS and FE setting showed an absence of any effect.

6.3 Jensen's Alpha

Independent Variable	**Dependent Variable: Jensen's Alpha**	
Percent of Women	.00056	-.00017
	(0.53)	*(-0.10)*
Board Size	-.0187**	-.0195
	(-2.00)	*(-1.32)*
Business Segments	-.0056	.0049
	(-1.54)	*(0.54)*
Log of Sales	-.0126	.1018***
	(-1.36)	*(3.84)*
Constant	-.3380	-.7794***
	(-1.54)	*(-3.28)*
F-statistic	5.06	4.10
R-squared	.0363	.0215
Regression Type:	OLS	FE

Table 6: regression results for Tobin's Q. The values of the t-statistics are displayed within the brackets. The stars indicate the statistical significance of the coefficients, indicating a .01(***), .05(**) or .1(*) significance level. In the Fixed Effects specification, the R-squared displays the overall significance level.

In the regression for the Jensen's alpha values, both the OLS and FE specifications show no significant relationship between the gender composition and the performance.

6.4 Fama French Alpha

Independent Variable	**Dependent Variable: Fama French Alpha**	
Percent of Women	.0015*	-.0011
	(1.76)	*(-0.80)*
Board Size	-.0041	-.0100
	(-0.54)	*(-0.86)*
Business Segments	-.0060**	.0058
	(-2.06)	*(0.78)*
Log of Sales	-.0040	.0556***
	(-0.54)	*(2.65)*
Constant	-.1020*	-.4130**
	(1.65)	*(-2.20)*
F-statistic	2.56	2.05
R-squared	.0187	.0083
Regression Type:	OLS	FE

Table 7: Regression results for Fama French alpha. The values of the t-statistics are displayed within the brackets. The stars indicate the statistical significance of the coefficients, indicating a .01(***), .05(**) or .1(*) significance level. In the Fixed Effects specification, the R-squared displays the overall significance level.

For the Fama French Three-Factor alpha values, the OLS specifications shows a positive relationship between the level of female representation of the board and the risk-adjusted performance, significant at the 10 percent significance level. In this setting, an increase of the female representation on the board of directors by one percentage point increased the risk-adjusted return by approximately .107 percentage points.

In the FE specification for the Fama French Three-Factor alpha values, no significant relationship was found between the gender composition and performance.

6.5 Beta

Independent Variable	**Dependent Variable: Beta**	
Percent of Women	-.0024**	.00009
	(-2.36)	*(.09)*
Board Size	.0125	-.0069
	(1.37)	*(-.81)*
Business Segments	.0092***	.0052
	(2.60)	*(1.09)*
Log of Sales	.0532***	.0497***
	(5.86)	*(3.80)*
Constant	.2800***	.4261
	(3.70)	*(3.58)*
F-statistic	24.78	
Wald Chi Squared		19.38
R-squared	.1577	.1358
Regression Type:	OLS	RE

Table 8: Regression results for the Beta value. The values of the t-statistics for OLS and z-statistics for RE are displayed within the brackets. The stars indicate the statistical significance of the coefficients, indicating a .01(***), .05(**) or .1(*) significance level. In the Random Effects specification, the R-squared displays the overall significance level.

In the OLS setting for the beta value, a negative relationship was found, significant at the five percent significance level. In this setting an increase of the gender composition with one percentage point decreased the beta value by .0024. In the RE setting no significant relationship was found.

For the performance measures, Hausman tests were conducted in order to determine the presence or absence of systemic patterns in the measure (see Appendix). The null hypothesis of a lack of persistence in the variable was rejected at the one percent significance level for RoA, Tobin's Q and the CAPM and Fama French alpha values. This implies the use of a FE rather than RE estimator. For the beta value, the null hypothesis could not be rejected at any significance level. This implies the use of a RE estimator.

7. Analysis

When looking at the evidence provided by the regressions, the effects of the gender composition on performance are mixed. For the RoA value, the results show a negative effect in the case where firm-specific traits are controlled for, but a positive effect otherwise. This is consistent with the picture portrayed by Adams & Ferreira (2009) where over-performing businesses show a higher female representation, but where the causality tends to be of such a nature that firms being more progressive leads to a higher performance and a higher share female representation, but increasing the female representation in itself reduces performance. However, a ten percent significance level for both the OLS and FE specification implies that one cannot draw too clear a picture of the relationship.

No effects were found regarding Tobin's Q. This was contradictory to the findings of Adams & Ferreira (2009), where the authors found a positive effect in the OLS setting and a negative in the FE setting. However, the findings are in line with the the evidence provided by Carter et al (2010), where diversity did not affect performance.

For the other areas of analysis, the OLS setting for the Fama French alpha showed a positive effect, significant at the ten percent significance level. In the other specifications, both for the Fama french and Jensen's alpha values, no significant relationship could be observed. Thus, no observation met the standard five percent significance level. The absence of effect on risk-adjusted performance is consistent with the EMH, which claims that one cannot systematically beat the market by choosing securities, in this case the stocks of firms, of any particular characteristic. The findings stand in contrast to the evidence provided by Francoeur et al (2008) where a higher level of female representation was associated with a higher risk-adjusted performance for stocks within the FTSE index.

Regarding the beta, the evidence suggests that firms with a higher share of women on the board of directors display a lower level of systematic risk in the OLS setting. However, in the RE setting there was no relationship between gender and systematic risk. The results of the OLS regression is consistent with the findings of Adams & Ferreira (2009), where firm years with female representation showed a lower volatility. It stands in contrast to the findings of

Adams & Funk (2012), where female directors showed a lower level of risk-aversion, which potentially could lead to a higher level of risk for the companies being run. However, the RE setting shows that there was an absence of any effect when looking at changes within the individual firms. This could indicate a presence of the same type of reverse relationship which was observed for RoA, where companies of a certain type tend to hire women, rather than the presence of women altering the management. On a causal level, the findings stand in contrast to the evidence which has suggested a higher level of risk-aversion among women. Altering the gender composition of individual firms did not not reduce the level of risk in these firms.

Overall, the evidence does not provide a clear picture of a relationship between the gender composition of the board of directors and financial performance for Swedish large cap companies. The majority of the regressions did not display any significant effect and no regression exceeded the standard five percent significance level. There is thus no support for Hypothesis I, II and III, stating an effect on ROA, Tobin's Q and the alpha values respectively. Furthermore, the evidence does not show support for Hypothesis III, which stated a positive relationship regarding the beta value.

From a theoretical perspective, the findings are generally more in line with the Agency Theory and the Human Capital Theory, where gender does not provide a straightforward result. The findings do not display the clear suggested relationships, which would be present if the theoretical frameworks of the Resource Dependence Theory or the Social Psychology Theory were the main set of drivers leading the results. The findings are consistent with the article by Carter et al (2010), where the authors theorize that a contingency explanation is the most suitable description of the findings, and that the effects can depend of the time frame and other more specific circumstances.

8. Conclusion

When summarizing the findings of this thesis one can conclude that gender was not found to be a predictor of performance for firms within the Swedish large cap index. This was true both in terms of risk-adjusted and unadjusted measures. A higher female representation was related to a lower level of systematic risk, but altering the composition itself did not imply a lower level of such risk, since the effect was not present once firm-specific characteristics had been controlled for.

In terms of policy advice, the evidence from this thesis does not show support for a mandatory quota, based upon the business case for diversity. As in the article by McCann & Wheeler (2011), one would need a different motivation for such measures, such as a social justice argument.

In terms of advice for investors and shareholders electing members of the board, gender does not appear to be a driver of value, in terms of the business case. However, for the purpose of ESG perspectives, one may use gender as a motivation. And in the evidence provided by this

thesis there is no clear indication of a loss in shareholder value for picking firms with a higher share of women.

In conclusion, the findings of this thesis do not suggest that the gender composition is a predictor for performance. It does suggest that firms with a higher share of females display a lower level of systematic risk, but changing the composition in itself does not reduce risk.

For future research considering gender and performance, the inclusion of risk-adjusted measures can be suggested. Since research has displayed differences regarding the risk aspect, the omission of this factor implies that one potentially crucial dimension is left out of the analysis. Other risk factors, besides the beta and Fama French factors could also add more pieces to the puzzle. One possible aspect that could be added is the momentum factor used in the Carhart four-factor model. Another possible area of analysis could be the relationship between gender and model risk and tail risk. Since women are shown to display a higher ambiguity aversion compared to men, this could have a potential impact of the perspectives related to risks that are more difficult to measure, such as the risk of a misspecified model and extreme outliers.

Analyses of different sizes of firms could also widen the perspectives in future research.

Furthermore, the use of methodologies which take the firm-specific traits into account can be suggested. Both the evidence regarding RoA in this thesis and the evidence provided by Adams & Ferreira (2009) display opposing signs of the regressors, when comparing the case when the firm-specific factors are controlled for or omitted. The differences in beta disappeared when the time dimension was added to the regression. Thus the nature of the relationship is more precisely specified when the time dimension is included.

9. References

Adams, R. & Ferreira, D. (2009). Women in the Boardroom and their Impact on Governance and Performance. *Journal of Financial Economics* 94, 291-309.

Adams, R. & Funk, P. (2012). Beyond the Glass Ceiling: Does Gender Matter? *Management Science* 58, 219 – 235.

Agnew, J., Anderson, L., Gerlach, J. & Szykman, L. (2008). Who Chooses Annuities? An Experimental Investigation of the Role of Gender, Framing, and Defaults. *American Economic Review,* 98, 418–442.

Campbell, K. & Minguez-Vera, A. (2008). Gender Diversity in the Boardroom and Firm Financial Performance. *Journal of Business Ethics,* 83: 435–451.

Carter, B., D'Souza, F., Simkins, D. & Simpson, W. (2010). The Gender and Ethnic Diversity of US Boards and Board Committees and Firm Financial Performance. *Corporate Governance: An International Review*, 18(5): 396–414

Babalos, V., Caporale, G. & Philippas, N. (2015). Gender, Style diversity, and their Effect on Fund Performance. *Research in International Business and Finance,* Vol 35, 57-74.

Baquero, G., ter Horst, J. R. & Verbeek, M. (2005). Survival, Look-Ahead Bias and Persistence in Hedge Fund Performance, *Journal of Financial and Quantitative Analysis,* 40, 493–518.

Bello, Y. (2005) Socially Responsible Investing and Portfolio Diversification. *Journal of Financial Research*, Vol. 28, No 1, 41-57,

Booth, J. & Deli, D. (1999) On Executives of Financial Institutions as Outside Directors. *Journal of Corporate Finance*, 5: 227–250.

Borghans L., Golsteyn B., Heckman J and Meijers H. (2009) Gender Differences in Risk Aversion and Ambiguity Aversion. *National Bureau of Economic Research,* working paper.

Bøhren, Ø., & Strøm, R. Ø. (2010) Governance and Politics: Regulating Independence and Diversity in the Boardroom. *Journal of Business Finance and Accounting,* vol 37, 1281-1307

Dagens Nyheter (2016) *Löfte om kvotering står fast,* March 10th, http://www.dn.se/ekonomi/lofte-om-kvotering-star-fast/

Damodaran, A. (2011). Applied Corporate Finance, 3rd Edition. John Wiley & Sons Inc.

Daunfeldt, S-O. & Rudholm, N. (2012). Does Gender Diversity in the Boardroom Improve Firm Performance? Working Paper No 60, HUI Research.

Francoeur. C., Labelle, R. & Sinclair-Desgagne´, B. (2008). Gender Diversity in Corporate Governance and Top Management *Journal of Business Ethics* 81:83–95

Gaunt, C. (2004) Size and Book to Market Effects and the Fama French Three Factor Asset Pricing Model: Evidence from the Australian Stockmarket, *Accounting and Finance,* 44, 27–44

Paolo Giordani, P., Tor Jacobson, T., von Schedvin, E., & Mattias Villani, M. (2011) Taking the Twists into Account: Predicting Firm Bankruptcy Risk with Splines of Financial Ratios, *Sveriges Riksbank,* Working Paper Series 256

Göteborgsposten (2016) *Alice Teodorescu: Goda föresatser på vägen till helvetet*, March 18th http://www.gp.se/ledare/alice-teodorescu-goda-f%C3%B6resatser-p%C3%A5-v%C3%A4gen-till-helvetet-1.5580

Hartog, J., Ferrer-i-Carbonell, A. & Jonker, A. (2002). Linking Measured Risk Aversion to Individual Characteristics. *Kyklos,* 55, 3-26.

Haslam, A., Ryan, M., Kulich, C.,2 Trojanowski, G., & Atkins, C. (2010). Investing with Prejudice: The Relationship Between Women's Presence on Company Boards and Objective and Subjective Measures of Company Performance. *British Journal of Management,* Vol. 21, 484–497

Hillman, A., Shropshire, C. & Cannella, A (2007) Organizational Predictors of Women on Corporate Boards. *Academy of Management Journal,* Vol 50, No 4, 941-952.

Huang, J. & Kisgen, D. (2013) Gender and Corporate Finance: Are Male Executives Overconfident Relative to Female Executives? *Journal of Financial Economics* 108, 822–839

Jensen, M. (1967). The Performance Of Mutual Funds In The Period 1945-1964. *Journal of Finance*, Vol. 23, No. 2, 389-416.

Jensen, M. & Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3: 305–360.

Labelle, R., Francoeur, C. & lakhal, F. (2015). To Regulate Or Not To Regulate? Early Evidence on the Means Used Around the World to Promote Gender Diversity in the Boardroom. *Gender, Work & Organization*, Volume 22, No 4 339–363.

Lewellen, T. & Nagel, S. (2006). The Conditional CAPM does not explain Asset-Pricing Anomalies. *Journal of Financial Economics,* Volume 82, issue 2, Pages 289–314

McCann & Wheeler (2011) Gender Diversity in the FTSE 100: *The Business Case Claim Explored. Journal of Law and Society*, Vol 38, No. 4, December, ISSN: 0263-323X, pp 542-47

Nannesson, F. (2014) Kvinnor i Styrelser – Internationellt. *Ekonomifakta* http://www.ekonomifakta.se/Fakta/Arbetsmarknad/Jamstalldhet/Kvinnor-i-styrelser/

Nygaard, K. (2011) Forced Board Changes: Evidence from Norway. Working paper series, Norwegian School of Economics.

Ohlson, J. (1980) Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research* Vol. 18, No. 1, pp. 109-131

Reguardo-Alvadaro, N., de Fuentes, P., & Laffarga, J. (2015) Does Board Gender Diversity Influence Financial Performance? Evidence from Spain. *Journal of Business Ethics,* 1-14, DOI 10.1007/s10551-015-2735-9

Roberts, M. & Whited, T. (2012) Endogeneity in Empirical Corporate Finance. *Handbook of the Economics of Finance* Volume 2, 2012, Elsevier.

Rose (2007) Does Female Board Representation Influence Firm Performance? The Danish Evidence. *Corporate Governance: An International Review,* 15, 404-413

Shin, H. & Soenen, L. (1998). Efficiency of Working Capital Management and Corporate Profitability. *Financial Practice & Education*, vol. 8, no. 2, 37−45.

Singh, V., Terjesen, S. & Vinnicombe, S. (2008). Newly Appointed Directors in the Boardroom: How do Women and Men Differ? *European Management Journal,* Vol. 26, No 1 48-58.

Svenska Dagbladet (2014). *Borg hotar med lag om kvotering*, February 15th, http://www.svd.se/borg-hotar-med-lag-om-kvotering

Sveriges Radio (2014) *S och MP överens: kan bli lag om kvotering 2016*, September 30th, http://sverigesradio.se/sida/artikel.aspx?programid=83&artikel=5979115

Verbeek, M. (2012) A Guide to Modern Econometrics. 4th Edition. John Wiley & Sons Inc.

Westphal, J. D. & Milton, L. P. (2000). How Experience and Network Ties affect the Influence of Demographic Minorities on Corporate Boards. *Administrative Science Quarterly*, 45: 366–398.

10. Appendix

Hausman Test		
Variable	*Chi Squared*	*P > Chi Squared*
RoA	18.68	.0009
Tobin's Q	30.62	.0000
Jensen's alpha	25.95	.0000
Fama French alpha	15.34	.0040
Beta	5.50	.2400

Table 9: Hausman test for choice of time series specification.