Is There a Business Case for Gender Diversity?

Clara Stigring 860130 and Frida Lyxell 860925

School of Business, Economics and Law, University of Gothenburg

Industrial and Financial Management

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ABSTRACT

This study examines the relationship between gender diversity in board of directors and top management and firm financial performance for 249 Swedish companies listed at the Stockholm stock exchange over a period of seven years. This research is important because it is the first panel data analysis of Swedish companies examining whether gender diversity is associated with improved financial performance. After controlling for size, industry, market performance and age we find no relationship between gender diversity and firm financial performance.

I. Introduction

"There is real debate between those who think we should be more diverse because it is the right thing to do and those who think we should be more diverse because it actually enhances shareholder value. Unless we get the second point across, and people believe it, we're only going to have tokenism." (Brancato and Patterson, 1999)

The so called business case for diversity was first presented by Robinson and Dechant (1997), who argued that board diversity would benefit companies in a financial sense and that it should be seen in the context of increasing shareholder value. The topic of the relationship between firm financial performance and diversity has since then been subject to a lively debate and the focus of a number of research studies (Carter *et al*, 2002). However, the findings of these various studies have been somewhat ambiguous. Studies using observations at only one or two points in time generally find a positive relationship between gender diversity on boards and firm financial performance. (Erhardt, *et al*, 2003) (Catalyst, 2004). While studies using panel data analysis, *i.e.* observations over a number of years, to explore the link between gender diversity and firm financial performance, find no relationships (Farrell and Hersch, 2005) (Dobbin and Jung, 2011) or negative relationships (Adams and Ferreira, 2009).

In 2010 there were 21.9 % women on board of directors in Swedish companies listed at the Stockholm stock exchange and 14.2 % women in top management positions; corresponding numbers for 2004 was 15.2 % and 13.7 % (Andra AP-fonden, 2010). While this is an increase, 25 % of Swedish companies still do not have a single woman on their boards. (Grant Thornton, 2011). The slow progress has caused some governments to take action; in Norway regulations state that the board of directors of private firms must consist of at least 40 % women. Consequently the number of women on boards of directors is often seen as a political issue. But, if in fact a diverse top management does increase shareholder value it should be seen as a financial issue (Hoel, 2004)

The aim of this paper is to examine the relationship between gender diversity in board of directors and top management and the financial performance of Swedish companies listed at the Stockholm stock exchange. In other words, is there such a thing as a business case for gender diversity?

The rest of this paper is organized as follows. In Section II we review the concept of diversity and its impact on group performance. In Section III we summarize previous research on gender diversity and financial performance. In Section IV we discuss our sample data and the methodology of this paper. In Section V we present our results. In section VI we draw conclusions from our findings.

II. Diversity and Group Performance

"Often what a women or a minority person can bring to the board is some perspective a company has not had before – adding some modern-day reality to the deliberation process. Those perspectives are of great value, and often missing from an all-white, male gathering.

They can also be inspiration to the company's diverse workforce" (Wall Street Journal, August 12, 1996)

A.   *Diversity*

In previous studies on diversity, in the context of firm performance, two general distinctions has been defined; demographic and cognitive diversity. Demographic diversity refers to the observable differences such as age, gender, ethnicity and race while cognitive diversity points to the non-observable differences such as knowledge, education, values, affection and personality characteristics (Erhardt 2003). Most previous studies on corporate governance and firm financial performance have taken the perspective of demographic diversity. Carter *et al* (2002) defined diversity as the percentage of women, African-American, Asians and Hispanic on board of directors. Marimutu (2009), Milliken and Martins (1996) and Watson *et al* (1998) all define diversity as the proportion of women and minority groups. In later years the focus of diversity research has shifted towards gender diversity, often defined as the proportion of women on board and/or in top management (Adler 2001), (Burke and Mattis 2000), (Catalyst 2004). The focus of this paper is gender diversity on boards of directors and in top management.

B.   *Diversity and Group Performance*

The relationship between diversity and group performance is divided into two conflicting perspectives; some argue that diversity has a positive impact on group performance while others claim to have found a negative impact. Research has been performed on the subject, with ambiguous results. Researchers that have found empirical evidence that diversity and group performance have a positive correlation argue that it increases the knowledge, creativity and innovative ability of the group and therefore tend to be more competitive (Watson *et al,* 1993). A company with a diverse workforce is better at attracting and retaining the most

talented people, enhancing the ability of market understanding, efficient problem solving and display a greater organizational flexibility and overall performance (Cox & Blake 1991). A study performed by Bantel (1993) found a positive relationship between background and educational diversity and the performance of executive groups within the banking industry. He concluded that diversity had a positive effect on innovativeness and decision making at strategic levels. Other opposing researchers have found that diversity have a negative effect on group performance. Knight *et al* (1999) point out that heterogeneous groups may experience internal conflicts and strains that can slow down the decision making process and by that affect firm performance negative. Treichler (1995) came to the conclusion that heterogeneous groups tend to increase the expenditures due to the fact that satisfying and accommodating the needs of various types of employees is more costly. Pelled *et al* (1999) found that homogenous groups can outperform heterogeneous ones when it comes to communication effectiveness and better avoid conflicts and negativity and therefore perform better. If in fact diversity has a positive impact on group performance this would suggest that more women on boards and in top management would be beneficial to a firm's financial performance and thereby support the business case for gender diversity.

III. Theories of Gender Diversity and Financial Performance

A.   *A Business Case for Diversity*

When Robinson and Dechant (1997) first presented the idea of a business case for diversity they also presented five underlying reasons for why a diverse management would be financially beneficial to companies. Firstly, companies that focus on diversity will better utilize their employee's skills and will tap into a larger segment of the talent pool. Secondly, diversity will increase the marketplace understanding, by matching the diversity of the

company to the diversity of their potential customer base and suppliers. Thirdly, a diverse management will enhance the effectiveness and breadth of their leadership and will better understand the complexity of the business environment. Fourth, diversity will enhance creativity in the company and diverse groups make more innovative business decisions. Fifth, the problem solving ability of a group will be enhanced, the number of different perspectives presented will force the group to evaluate various alternatives and more carefully consider different aspects of complex decisions. Ultimately they argued that diverse companies will make better decisions, produce better products and in the end attain better financial results than their more homogenous competitors.

B.   *Previous Research*

Connecting firm performance to gender diversity has attracted the attention of numerous researchers and produced a vast amount of differing results. Studies using cross-sectional data generally find a positive relationship. However, these studies are inclined to have problems with endogeneity and do not check for direction of causality, meaning that they can not rule out the possibility that successful firms are simply more likely to appoint women to top positions (Dobbin and Jung, 2011). In 2004, the nonprofit organization Catalyst performed a cross-sectional study of 353 *Fortune 500* firms. They found that companies with the highest representation of women in their top management experienced better financial performance, measured by return on equity (ROE) and total return to shareholders (TRS), than companies with the lowest representation of women. Similar results was found by Carter *et al* (2002) when examining board diversity and firm value, measured by Tobin's Q, for 637 of *Fortune 1000* firms. A research paper by Erhardt *et al* (2003) found a positive relationship between board diversity, defined as the percentage of women and minority groups, and financial performance when examining 127 large American firms. The report stated that a diverse

board of directors had a positive impact on the overall organizational performance. Shrader *et al* (1997) examined the relationship between firm financial performance and gender diversity in management, top-management and on board of directors for 200 American firms with the largest market value. However, they could not find that a higher percentage of women in top management and on board of directors were disproportionately associated with firm performance. They pointed out that an apparent reason for their findings could be that there were too few women in their sample firms; the average number of women in top management was only 4.5 %. None of the studies mentioned take the question of causality into consideration.

Studies using panel data suggests a somewhat different relationship. Smith *et al* (2006) performed a panel data analysis of 2 500 Danish firms for the years 1993-2001 and found that female outside directors had a negative impact on firm performance, however, female board members elected by the staff had a positive effect. Similarly, Adams and Ferreira (2009) found that on average the effect that gender diversity has on firm performance is negative when examining 1 939 firms of the Standard & Poor's 500 (MidCap and SmallCap) between the years 1996-2003. In a recent study from 2011, Dobbin and Jung analyse panel data for 432 major American corporations over the period 1997-2006 and find that female directors have negative effects on stock value but no effects on profits. Adler (2001) performed an extensive 19-year study of 215 Fortune 500 firms. They examined the relationship between financial performance and women on board and in the top 20 executive positions. They found that the 25 firms with the best record of promoting women into executive suits were between 18 and 69 % more profitable than the median Fortune 500 firm. Even if their data was both longitudinal and cross-sectional their statistical method of choice did not take advantage of the panel data structure of their observations.

The fact that cross-sectional studies, examining observations over only one or two years, seem to find a positive relationship while panel data studies generally find a negative or no relationship is consistent with the idea that successful firms are more likely to recruit women into top positions. Farrell and Hersch (2005) addressed this aspect directly when examining 300 *Fortune 1000* firms between the years 1990-1999. They found that firms with high returns on assets were more likely to recruit women into their boards, but that women did not have an impact on firm performance. Adams and Ferreira (2009) also found that Tobin's Q could predict the appointment of female directors.

As Shrader *et al* (1997) pointed out; having a low percentage of women in the sample firms might impinge the statistical results. In May 2011 Swedish boards consists of 27.3 % women, positioning Sweden as the country with the second largest proportion of women on boards of directors in the world (Catalyst, 2011), making it an interesting country to study. However, the efforts to explore the link between gender diversity and financial performance in Sweden has so far been limited, especially with panel data as the statistical approach. Also most studies are limited to including only proportion of women on boards of directors. According to Fama and Jensen (1983) the board of directors is an important part of the governance structure and play an important role for a company and in the monitoring process of shareholder interests. Zahra and Pearce (1989) add that the activity of the board is by every mean a factor that affects the financial performance of the firm. However, the top management is also a viable part of the company and is the group responsible for identifying environmental opportunities and threats, analyzing relevant information, organizational development and formulate and implementing strategic changes (Mintzberg, 1979), making it relevant to also include top management when evaluating firm financial performance.

We therefore aim to examine the relationship between gender diversity on board of directors and in top management and firm financial performance for 249 Swedish companies listed at the Stockholm stock exchange between the years 2004-2010 by performing a panel data analysis.

IV. Data Sources and Method

A.   *Sample*

To investigate the relationship between gender diversity and firm financial performance we will perform a quantitative panel data[1] analysis. Having information about the same firms over a number of years allows us to control for unobserved heterogeneity among firms. Panel data allows for a statistical analysis that contains both spatial and temporal dimensions. In this analysis the spatial dimension will be the comparison between the different firms on the Stockholm stock exchange and the temporal element will be the periodic observations of diversity and performance over time. One of the major attractions with panel data analysis is that it provides a mean to control for time-invariant unmeasured (omitted) variables that influence the dependent variable *i.e.*these variables will be firm specific and will not vary over time. To conduct this statistical analysis we will also take into account a number of control variables; firm size (estimated by the number of employees), firm age, market performance (estimated by the OMXSPI Index) and industry affiliation.

Our set of data will constitute an unbalanced panel; when studying all firms on the Stockholm stock exchange over a time period of seven years, some firms will have been delisted as a consequence of bankruptcy or mergers and some new firms will have been listed after 2004.

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[1] For further information about panel data see Appendix

This means that we will have an uneven number of observations for some of the firms and our data will therefore constitute an unbalanced panel (Hsiao 2003).

B. *Variables*

When examining firm financial performance different performance measurements can and have been used. In this study net income divided by common equity (commonly referred to as return on equity or ROE) and net income divided by total assets (return on assets or ROA) will be used to estimate our dependent variable; firm performance. The reason for choosing these profitability measures is that they are among the most commonly used to indicate a firms earnings and return to shareholders (Catalyst, 2004), (Erhardt *et al*, 2003), (Shrader *et al*, 1997). The reason for using two different measurements as dependent variables is to check the consistency of the regression (Marimuthu, 2009).

The financial performance data (ROA and ROE) has been collected from "Data Stream". However, data on either ROE or ROA was missing for a number of companies and were therefore taken out of the sample. Information about firm size, estimated by the total number of employees, was also available in "Data Stream". The general performance of the market is estimated with the OMXSPI Index.

Since the year 2004, Folksam has published a study called "Gender Diversity Index", containing information about the percentage of women on board of directors and in top management in Swedish companies listed at the Stockholm stock exchange. From these studies the gender diversity data has been collected. In 2004 the study contained information on 248 listed companies. During 2008 and 2009 Folksam performed a somewhat different study and therefore did not publish information about gender diversity. Information about the proportion of women in top management and board of directors for these two years was

therefore obtained from annual reports for each separate company. After collecting information from every year until 2010 we had information about 275 companies. The definition of the board of directors is the ordinary members not including employee representatives, and the definition of top management is the top executive management group which include; the president, vice president, presidents for affiliates, chiefs for specific geographic areas, chiefs for business areas/métiers and chief financial positions.

In order to control for other factors that affect firm financial performance a number of control variables have been included in the study; firm size, firm age, market performance and industry affiliation. Firm size, measured by the logarithm of the number of employees, is expected to be positively related to firm performance since older firms normally have more market power (Smirlock *et al*, 1984) An older firm is expected to have more experience in the market and therefore display a better financial performance (Lipczinsky and Wilson, 2001). The logarithm of the age of the firm is therefore used as a control variable. To eliminate the impact of the market overall fluctuations a market performance measure has been included; estimated by the return of the OMXSPI index. The industry affiliation is controlled for by including a variable that takes the average percentage of women in the industry in relation to the proportion of women in the specific firm into consideration. The sample have been divided into nine industries according to Affarsvarldens definitions; Finance, Healthcare, Industrial, IT, Consumer goods, Media and Communication, Commodities, Services and Telecommunications.

After collecting all the information needed we were left with an unbalanced panel consisting of 249 companies observed during the period of 2004-2010.

C. *Descriptive Statistics*

Table I provides descriptive statistics about our sample data. The average firm has a total number of employees of 4 690. The average age of the sample firms are 44.7 years. Percentage of women on boards of directors average 17.8 % and in top management corresponding number is 11.9 %, making the average of the two 14.9 %.

TABLE I
Descriptive statistics

Variable	Number of firms	Mean	Std dev
Firm Age	249	44.73	43.0
% of women on board	249	17.79	12.77
% of women in top management	249	11.96	13.57
% of women on board and management	249	14.88	10.41
Return on assets	249	3.80	16.78
Return on equity	249	3.98	47.91

Over the course of the seven years that have been studied, the percentage of women on boards of directors and in top management has gone from 11.6 % in 2004 to 16.7 % in 2010 for the 249 sample firms. The biggest increase can be contributed to the percentage of women on board of directors; it has gone from 12.3 % in 2004 to 20.9 % in 2010, while the percentage of women in top management has gone from 10.7 % in 2004 to 12.2 in 2010.

TABLE II
Percentage of women on boards and in management over the period 2004-2010

Year	% of women on board	% on women in management	% of women on board and manag.
2004	12.29	10.68	11.61
2005	15.36	11.30	13.50
2006	16.71	11.71	14.37
2007	19.27	11.84	15.75
2008	19.21	12.86	16.22
2009	20.72	13.04	17.09
2010	20.87	12.22	16.70

Media and communications is the industry that displays the highest numbers of women on board of directors and in top management with an average of 22.9 %. Telecommunications displays the lowest number with only 10.8 % women. The industries that have the highest average ROA over the seven year period is the service industry and the consumer goods industry, they booth averaged 7.3 % return on assets. The oldest firms are found in the commodity industry with an average of 69.9 years closely followed by the industrial industry with an average of 61.7 years. When analysing the different industries separately by simple linear regression analysis, we find that in the consumer goods industry there is a significant relationship between the percentage of women on the board of directors and ROA as well as ROE. The industrial industry and the telecommunications industry also show significant relationships when the financial performance ROE is used.

When analyzing data from the year 2010 and splitting the observations into quartiles of firms (in accordance with the analysis performed by Catalyst in 2004) with aspect to the percentage of women on board of directors and in top management, the quartile with the highest percentage of women also display the highest return on assets. The best quartile has an average ROA of 2.9 % while the quartile with the lowest percentage of women has an average ROA -1.5 %. These results are displayed in table III.

TABLE III
Percentage on women in boards and in management and ROA for the top and bottom quartile

Quartile	% of women on board and management	ROA
Top Quartile	30.15	2.78
Bottom Quartile	4.13	-1.15

When performing simple linear regression analysis for the percentage of women on boards and ROE for each separate year, positive relationships is found for all years except 2010, and they are significant for three of the years (2007-2009). Similar results are found for the performance measure ROA. This is consistent with previous cross-sectional research that has

analyzed women on board of directors and financial performance for only one point in time. Results are displayed in table IV.

TABLE IV
Simple linear regression analysis. Relationship between percentage of women on boards and firm financial performance

Year	ROE		ROA	
	Coefficient	**P>|t|**	**Coefficient**	**P>|t|**
2004	0.140	0.493	-0.010	0.915
2005	0.218	0.288	-0.020	0.833
2006	0.268	0.120	0.069	0.522
2007	0.498	0.047*	0.234	0.001
2008	0.480	0.013*	0.109	0.235
2009	0.495	0.002*	0.235	0.014
2010	-0.570	0.260	0.247	0.012
*Significant at a five percent significance level				

D.   *Method for Panel Data Analysis*

In the analysis, the model with percentage of women on boards and in top management will be the main focus; however, we will also test the two variables separately and their relationship with firm financial performance.

For the panel data regression we estimate the following model:

$$Y_{it} = \alpha + \beta_1\,Diversity_{it} + \beta_2\,Size_{it} + \beta_3\,Age_{it} + \beta_4\,OMX_{it} + \beta_5\,Industry_{it} + (\mu_i + \upsilon_{it})$$

With i denoting individual firms and t denoting time (year). Y_{it} is the firm performance measured by either ROA or ROE. Diversity ($Diversity_{it}$) is defined as the percentage of women on board of directors and in top management, and is the variable of primary interest. Size ($Size_{it}$) is defined by the logarithm of the number of employees. Age (Age_{it}) is the logarithm of the number of years since the firm was founded. The market performance is estimated by the OMXSPI index (OMX_{it}). The average percentage of women in the specific industry in relation to the percentage of women in the specific firm for each year ($Industry_{it}$) is also included as a control variable. μ_i denotes the unobservable individual specific effects of

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the panel data and are assumed to be firm specific and time invariant. v_{it} denotes the remainder disturbance.

Firstly to determine whether the data exhibit characteristics of panel effect, *i.e.* possesses unobserved heterogeneity, an F-test will be performed. The test will conclude whether the fixed effects model is preferred over the pooled OLS model. To specify if the panel data display properties of random or fixed effects a Hausman test is performed. The random effects model will be valid if μ_i is uncorrelated with the explanatory variables. If the Hausman test rejects the random effects model a fixed effects model will be preferred and μ_i will be allowed to correlate with the explanatory variables. An individual model for each of the two performance measures will be estimated to check for consistency of the relationship. Pooled OLS model will be estimated for each performance measure to use as a comparison to the panel data analysis.

V. Results

Table V presents the results from running the pooled OLS analysis. The results for the relationships between the percentage of women on boards and in top management and firm financial performance are slightly positive (a one percent change in proportion of women will result in a 0.10 and 0.08 percentage change in ROE and ROA, respectively) but far from significant. The only significant coefficient is the one displaying a negative relationship between percentage of women in management and ROA. This would indicate that more women in top management would have a negative effect on ROA. This is in contrast to previous research, such as Catalyst (2004) and Smith *et al* (2006).

Performing F-tests for all of the models conclude that they possess unobserved heterogeneity and that the fixed effects model is preferred over the pooled OLS. When testing the data for

TABLE V
Pooled OLS. Relationship between percentage of women and firm financial performance measures

	ROE		ROA	
	Coefficient	**P>|t|**	**Coefficient**	**P>|t|**
% of women on board of directors	-0.082	0.559	0.089	0.073
% of women in top management	0.125	0.398	-0.122*	0.020
% of women on boards and in management	0.099	0.790	0.0769	0.558
* Significant coefficient at a five percent significance level				

fixed or random effects with the Hausman test the result show that for the model with ROA as the dependent variable and percentage of women on boards and in management as the main variable of interest the random effects model cannot be rejected. This means that the firm-specific effects (μ_i) are uncorrelated with the explanatory variables and are assumed to be random. Therefore the random effects panel data specification model is to be preferred.

TABLE VI
Results from Hausman test and panel data regression analysis.

	Hausman prob>chi^2	Random/fixed	Coefficient	P>|t|	Overall R^2
ROA:					
Board	0.021	Fe	-0.112	0.076	0.008
Management	0.065	Re	-0.012	0.838	0.065
Board and management	0.397	Re	-0.226	0.159	0.063
ROE:					
Board	0.050	Fe	-0.430*	0.032	0.058
Management	0.982	Re	0.189	0.273	0.077
Board and management	0.049	Fe	-1.179	0.102	0.063
* Significant coefficient at a five percent significance level					

Where ROE is used as the dependent variable the random effects model can be rejected and μ_i is allowed to correlate with the explanatory variables; the fixed effects panel data specification model is to be preferred. Results are shown in Table VI. The table also displays the results from running the random effects model where ROA is the dependent variable and the results from the fixed effects model where ROE is the dependent variable. No significant relationships are found between the percentage of women on boards and in top management and firm financial performance. This would mean that adding more women does not affect firm performance. This result is similar to those obtained by Dobbin and Jung (2011).

However, significant negative relationship is found between percentage of women on boards and ROE. A negative relationship with financial performance is consistent with previous panel data research where the percentage of women on boards is the main focus (Adams and Ferreira, 2009).

TABLE VII
Results from panel data analysis for control variables

	ROA		ROE	
	Coefficient	P>|t|	Coefficient	P>|t|
Constant	-7.500	0.054	-14.358	0.643
Diversity	-0.227	0.159	-1.179	0.102
Industry	0.300	0.075	0.753	0.311
Size (log)	3.510*	0.000	20.274*	0.004
Age (log)	2.761	0.192	-11.967	0.586
OMX	0.049*	0.001	-0.305*	0.000
* Significant at a five percent significance level				

In Table VII the relationships between the independent variables and the financial measurements are presented. The control variables size and OMX are significant for both financial measurements. The variable industry display no significant relationship, this indicates that having a higher percentage of women than the industry average does not affect firm financial performance measured by ROA or ROE.

Some limitations of this study are important to recognise. The result from this and previous studies depend heavily on which performance measure that has been used. Therefor it might not be possible to draw any general conclusions on overall firm performance even when significant results are found for a specific performance measure. This study has been performed on listed companies on the Stockholm stock exchange and the results might not be applicable to unlisted firms where the corporate structure might differ. The information on gender diversity collected from Folksam (2004-2010) is stated in relative terms. An

interesting aspect could have been to take the absolute values into account and thereby control for the size of the board and the top management.

VI. Conclusion

Using a sample of 249 Swedish firms listed on the Stockholm stock exchange over the period 2004-2010, this paper explored the relationship between gender diversity and firm financial performance. Most previous studies on the subject has found a positive relationship when using cross-sectional data, however when using panel data the results are somewhat different; positive, negative and no relationships have been observed. For this panel data study the conclusion is ambiguous and the results differ depending on the measurement of financial performance and on the measurement of the proportion of women (board, management or both) that is used. When the proportion of women in both board and management is measured over the period of seven years we find no relationships with firm financial performance. This would suggest that adding women into boards of directors and top management does not increase nor decrease firm financial performance (measured by ROA and ROE). When the relationship between proportion of women on boards of directors and ROE is examined a significant negative relationship is found.

The fact that we found no relationship is in contrast to research that found positive effects of gender diversity on group performance and by extension firm financial performance. It is also in contrast to a point made by Erhardt *et al* (2003) that women experience work disadvantages and therefore must outperform their male colleagues in order to be promoted, which would generate a higher qualification standard for women in top positions. A possible explanation for why women then do not effect firm financial performance is presented by Bilimoria and Piderit (1994); they found that women are typically assigned to positions that have less

instrumental impact on firm financial performance than their male counterparts and that they do not receive the same support and assistance.

The negative results found when examining women in board of directors can perhaps be explained by the negative effects diversity can have on group performance. A diverse board, as stated earlier, might experience internal conflict and strains that can slow down the decision making process by loss of communication effectiveness, and by that affect firm performance negatively.

An important aspect to take into consideration is the qualifications of women executives. If corporations start adding women into their boards and top management because of outside pressure from governments and public opinion without there being a sufficient potential pool of qualified women, this could have a negative effect on firm financial performance. This belief is consistent with what Smith *et al* (2006) concluded when looking at education and qualification of women on boards and in top management.

The topic of gender diversity is today a central theme of corporate governance as well as an often cited topic in the popular press. As shown by this study and other previous research on the subject the true relationship between gender diversity and firm performance appears to be complex and the question of a business case for gender diversity is still not conclusively determined.

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VIII. Appendix

A.   *Panel data*

When performing our statistical analysis we will be using panel data analysis. A panel data set is one that contains data from a given sample of objects, in our case firms, over a defined period of time. It will thereby provide a number of observations for each firm in the sample. Panel data allows for a statistical analysis that contains both spatial and temporal dimensions. In our analysis the spatial dimension will be the comparison between the different firms on the Stockholm stock exchange and the temporal element will be the periodic observations of diversity and performance over time. One of the major attractions with panel data analysis is that it provides a mean to control for time-invariant unmeasured (omitted) variables that influence the dependant variable. These variables will be firm specific and will not vary over time. Our set of data will constitute an unbalanced panel; when studying all firms on the Stockholm stock exchange over a time period of seven years, some firms will most likely have gone into bankruptcy and some new firms will have been listed after 2004. This means that we will have an uneven number of observations for some of the firms and our data will therefore constitute an unbalanced panel (Hsiao 2003). There are two analysis tools that are commonly used to analyze panel data; random and fixed effects models. The major difference between the two is that in the fixed effects model the omitted time-invariant variables are allowed to correlate with the included time-varying variables, while in the random effects model they are assumed to be uncorrelated (Bollen and Brand 2008). The random effects model has a greater efficiency, smaller standard errors and higher statistical power to detect the effects of the omitted variables (Hsiao 2003).

B. *Statistics*

Table VIII
Significant results from simple linear regression for each separate industry

Industry	ROA			ROE		
	Coefficient	P>|t|	Std.error	Coefficient	P>|t|	Std.error
Industrial	0.346	0.001	0.103			
Consumer goods	0.546	0.012	0.214	0.173	0.006	0.062
Telscommunications	0.879	0.023	0.380			
Services				-0.223	0.043	0.108

Table IX
Panel Data Regression Results

ROA	Coefficient	Std.Error	P>|t|
Diversity	-0.227	0.161	0.159
Size	3.510	0.963	0.000
Age	2.761	2.761	0.192
OMX	0.049	0.015	0.001
Industry	0.300	0.168	0.075
ROE			
Diversity	-1.179	0.721	0.102
Size	20.274	6.976	0.004
Age	-11.967	21.950	0.586
OMX	-0.305	0.049	0.000
Industry	0.753	0.742	0.311

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Sample firms

Finance	Biacore	Haldex	Betsson	Duni
ACAP Invest	Biogaia	Hexagon	Boss Media	Electrolux
Affärsstrategerna	BioInvent International	HL Display	Connecta	Fenix Outdoor
Atrium Ljungberg	Biolin	InduTrade	Cybercom Group	H&M
Avanza	Biophausia	Intellecta	Dagon	Hemtex
Brinova Fastigheter	Biotage	JM	Digital Vision	Husqvarna
Bure	Capio	Lagercrantz Group	Enea Data	JC
Carnegie	Diamyd Medical	Lindab	Fingerprint Cards	KABE Husvagnar
Castellum	Elekta	Malmbergs Elektriska	Framfab	KappAhl
Catena	Elos	Midway Holding	HiQ International	Lindex
Diös Fastigheter	Feelgood	Morphic Technologies	IBS	Mekonomen
East Capital Explorer	Getinge	Munters	IFS	NetOnNet
Fabege	Human Care	NCC	Jeeves Information System	New Wave Group
Fastigheter AB Balder	Karo Bio	Nederman Holding	Know IT	NIBE Industrier
FastPartner	LinkMed	Nefab	Mandator	Nilörngruppen
Geveko	Meda	Nova Cast Technologies	Micronic Laser System	Nobia
Hakon Invest	Medivir	OEM International	Modul 1 Data	NSP Holding
Handelsbanken	Orexo	Peab	MSC Konsult	Opcon
HEBA	Ortivus	Pergo	MultiQ	Retail and Brands (RNB)
Home properties	Probi	ProfilGruppen	Nocom	Sardus
Hufvudstaden	Q-Med	Rederi AB Transatlantic	Novotek	SinterCast
Industrivärlden	RaySearch Laboratories	Rejlerkoncernen	Orc Software	Svedbergs
Investor	Vitrolife	Saab	Precise Biometrics	Swedish Match
Kinnevik	**Industrial**	Sandvik	Prevas	Thalamus Networks
Klövern	ACSC	SAS	Pricer	**Media and comm.**
Kungsleden	Addtech	Scania	ProtectData	A-com
Latour Investment	Alfa Laval	Seco Tools	ReadSoft	Cision (Observer)
Ledstiernan	Assa Abbloy	Semcon	Resco	MTG
Lundbergsföretagen	Atlas Copco	Sensys Traffic	Sectra	TV4
NeoNet	B&B Tools	Skanska	Sigma	Zodiak Television
Nordea	BE Group	SKF	Softronic	Bergs Timber
Nordnet	Beijer Alma	Strålfors	Teleca	Billerud
OMX (OMHEX)	Beijer Electronics	Studsvik	Telelogic	Boliden
Ratos	Bong Ljungdahl	SWECO	Tilgin	Holmen
Sagax	Broström	Systemair	Trade Doubler	Höganäs
SalusAnsvar	Cardo	Trelleborg	WM-Data	Lundin Petroleum
SEB	Cashguard	Tricorona	**Consumer goods**	PA Resources
Skandia	Concordia Martime	VBG	Aarhus Karlshamn	Rottneros
Skanditek	Consilium	Volvo	Axfood	Rörvik Timber
Swedbank	CTT Systems	XANO Industri	Ballingslöv International	SCA
Svolder	Duroc	Xponcard	Bilia	ScanMining
Traction	Elanders	Ångpanneföreningen	Björn Borg	SSAB
Wallenstam	ElektronikGruppen BK	**IT**	Borås Wäfveri	**Services**
Wihlborgs Fastigheter	Fagerhultgruppen	AcandoFrontec	Brio	Academedia
Health care	G&L Beijer	AddNode	Clas Ohlson	BTS Group
Aerocrine	Gunnebo	Anoto Group	Cloetta (Fazer)	Eniro
Artimplant	Gunnebo Industrier	AudioDev	Doro	Intrum Justitia
				Niscayah Group