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## Women in Top Management and Firm Performance

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# Women in Top Management and Firm Performance

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## Abstract

**Abstract:** The purpose of this study is to present new evidence on the relationship between gender diversity in management and firm performance. According to corporate governance literature, board diversity is expected to affect firm performance. Using a large data set with more than 10000 time-observations for all Danish firms with more than 50 employees over the period 1994-2003, the analysis suggests that the proportion of women in top management jobs has from none to positive influence on firm performance. However, the results show that the strength of the effects of women in top management depends on how top CEOs are defined and on the method of estimation of the model. Next, the results point towards a positive influence on firm performance of the staff representation in the supervisory board of the firm but more women representing the shareholders in the supervisory board of the firm seems to be unimportant.

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## **1. Introduction**

Over the latest years there has been an ongoing discussion in press and among researchers on why there are so few women represented in company boards and furthermore whether there are enough women represented in the company boards and whether a higher proportion of women in top positions affects firm performance. In some countries there has even been a discussion whether the gender composition of the boards should be regulated by law, e.g. Denmark, Sweden and Norway, and in Norway it was decided that at least 40% of the members of the board of directors must be women. The theoretical rationalization for including more women in the company boards comes from management theories - diversity management. According to this theory more diverse boards may cause improved firm performance. Next, if gender discrimination exists, i.e. the firms are hiring more male managers irrespective of the fact that more talented female potentials may exist, the firm performance would of course be better off in case of a more balanced recruitment policy for managers.

The aim of this paper is to evaluate whether more women in company boards has an effect on performance. Based on a combined employer-employee data set for Danish firms with more than 50 employees we give new evidence – by using an augmented production function approach – on whether a higher proportion of women in the board of directors or whether more women among the Top CEOs of the firm has an influence on company performance. The time period analyzed is 1996-2003, which gives approximately 10.000 usable time-observations.

In the next section we discuss diversity management and earlier findings concerning gender diverse boards and firm performance is presented. In the following section the model

which is used in the empirical part of the paper is presented. The following two sections include data discussion and the results are presented. Section 6 concludes.

## **2. Gender diversity in management – some key findings**

According to the literature, see e.g. Carter et al. (2003), Singh and Vinnicombe (2004) and Smith et al (2006) there are several positive arguments advocating for diversity in management as seen from a ‘business case perspective’. The key argument in favour of management diversity is that a more diverse board of directors or managers is capable of making decisions based on different opinions from different people that have different experience, i.e. different working and non working experience of men and women may improve the decision making process. Furthermore more women in management most likely affects the career aspirations of younger women in lower positions positively and as a consequence the pool of potential candidates for top positions within the firm is increased, which in the longer run may affect firm performance positively.<sup>1</sup>

Note that there are also arguments against management diversity. Heterogeneous boards create more opinions and potentially more conflicts, which may be time-consuming and in-efficient, see Smith et al (2006). Thus, if business conditions change rapidly asking for quick responses from the managers, diverse boards could result in poorer performance.

Focussing on earlier findings the empirical evidence is mixed, see Carter et al. (2003) for an overview. Kochan et al. (2003) report no positive relations between firm performance and gender diversity in management (US companies). The same is the case in Shrader et al. (1997) who in some cases even find the correlation negative. Adler (2001) and Catalyst (2004) defines the concept ‘female-friendly’ firms and finds that the performance of these

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<sup>1</sup>Bell (2005), Burke and McKeen (1996) and Ely (1990).

firms is superior to that of other firms.<sup>2</sup> Swinney et al (2006) analyse performance among small business entrepreneurs within services and retail industries in Mid-West, US. Their results indicate that male entrepreneurs generally perform better than female entrepreneurs.

There are a few Scandinavian studies dealing with performance and gender diversity in management. In Böhren and Ström (2005) the relationship between the proportion of women among boards of directors and firm performance is found to be negative (Listed non-financial firms in Norway). Rose (2004) gets a negative, yet insignificant relationship between the percentage of women on the boards of directors and firm performance for Danish firms. However the sample is rather small and not representative for Danish firms, i.e. it includes only the 116 largest listed Danish firms. Another limitation of this study is that it uses simple OLS, i.e. single regression analysis. Focusing on a cross-section of the Top500 firms in Scandinavia Randøy et al (2006) find no significant correlation between gender diversity and firm performance.

Using 2500 Danish firms from 1993-2001 Smith et al (2006) find that the influence on firm performance coming from a higher fraction of female top CEOs varies from none to positive. The result is highly dependent on the choice of the performance measure and on the definition of CEOs and also on the method of estimation (OLS, IV, Fixed Effect-IV). Furthermore, female managers with a university degree seem to have a notable and positive influence on performance while female CEOs without any university degree have a much smaller or insignificant effect on firm performance. In addition staff elected female members of boards of directors affect firm performance positively while other female (non staff) board

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<sup>2</sup> See Smith et al (2006) for a more detailed discussion.

members seem to have a negative influence on performance, which most likely is due to the family ties to the owners that the women on boards quit often have.<sup>3</sup>

Finally Du Rietz and Henrekson (2000) analyse the influence on firm performance from women on boards for Swedish firms. They stress the importance of controlling for firm size and sectors and find no influence on performance from gender diversity in management.

Summing up, the empirical evidence in earlier studies is ambiguous. Of course this ambiguity may be caused by different data sets covering different kinds of firms, but it may also be due to different empirical methods. In some studies rather simple correlation analysis was used while a few other studies use e.g. panel estimation methods, e.g. control for unobserved heterogeneity and potential problems of endogeneity, see Smith et al (2006). Thus, there has been attention on whether the causality may go the other way around. The argument is that well-performing firms choose a more risky strategy concerning recruitment of board members and make a decision to employ more women. In this situation the analysis may still show an (positive) influence from gender diverse boards to the performance of the firm but the causality is the reverse.

### **3. Empirical model**

The empirical set up in this study deviates from earlier studies because the starting point is in IO-tradition. Thus, the gender diversity-firm performance relationship is analysed in an augmented production function framework

$$(1) \quad \log(Y) = a + \lambda T + \alpha \log(K) + \beta \log(L) + \gamma(GENDER) + \delta(Z) + \varepsilon$$

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<sup>3</sup> However, this study cannot identify whether the board members have family ties or not.

where  $Y$  is gross value added,  $L$  is the number of employees and  $K$  is the capital input (total capital of the firm). GENDER is a measure for gender diversity among the CEOs.  $Z$  is a vector of control variables (industry dummies) and other variables characterizing the market, entry barriers and the general business environment,  $T$  is a vector of time dummies and finally  $\varepsilon$ , is the error term assumed to be NID. According to the discussion above  $\gamma$  is expected to be positive, i.e. more diverse boards affect gross value added positively. Note that GENDER – the proportion of female CEOs is included in various forms, see below, which means that we test for gender diversity among the Top CEOs, Top CEOs including vice directors and also the proportion of females in the board of directors for various types of board members.

Besides industry dummies the vector  $Z$  also includes standard measures for market power, i.e. the market concentration ratio and furthermore the minimum efficient (production) scale relative to the market size takes account of entry barriers to the market, the export share of the firm etc. Normally the first two variables are expected to affect firm performance positively, i.e. higher entry barriers to the market increases profits. But note that managers may become more lax when market power has existed too long and therefore the influence may be negative as well see e.g. Lipczinsky et al (2005). E.g. larger export share would normally result in better performance (benefits from large markets) and the same might be the case if firms are home market oriented with no competing import.

#### **4. Data**

The information used in this analysis is a mixed employer-employee data set of the 5000 largest Danish firms observed during the period 1993-2003. Data was collected as an unbalanced panel with the restriction that each firm must appear for at least 5 years. Furthermore, noting that Denmark is a relatively small country with many small and medium sized firms the data set used in the empirical analysis includes firms with more than 50 employees. The starting point in the data generating process is account information for each firm coming from a private data collecting company, Experian A/S. Based on the Annual

Report for all Danish firms this data set includes various performance measures and economic information and characteristics of the board members, the number of employees and other firm demographic characteristics. Companies with ‘abnormal values’, which is mainly defined as either negative net capital or extreme ratios between firm’s revenue and employment are excluded in order to isolate holding companies etc. Therefore the consolidated data set is slightly smaller. Note that the sample includes listed as well as non-listed firms and nearly all listed companies, i.e. 200 firms per year, are included in the sample. Consequently the majority of the firms included are non-listed firms, and therefore the data set is more general and representative as compared to the samples used in many other studies of women in management.

Next, merging firm information with information from administrative registers, plentiful information on all employees within the firms can be added. Thus for each CEO the registers include e.g. salaries, occupation and a huge number of background characteristics like education, age, the number of children etc. Furthermore the same information has been taken in for their spouses, see below.

In accordance with the augmented production function approach we measure firm performance by gross value added, which is defined as net turnover minus input expenses (intermediary inputs). Consequently, our performance measure used in the analysis corresponds to firms’ average mark up. The capital input is the total capital of the firm and the labour input is measured by the number of employees.

The management of private firms in Denmark is arranged as a two tier system. The stockholders choose the board of directors at the annual assembly. Except for family firms the board of directors typically consists of external board members (except for the staff

elected members). Also, the chairman of the board is quite often an external member, i.e. the CEOs (managers) are not presidents of the company and managers at the same time.

Because the data set includes firms with more than 50 employees, a number of board members are selected among the staff in firms. We distinguish between staff and non staff members of the board of directors.

The data set includes information on boards of directors as well as the CEOs. In this study the concept of managers (CEOs) is different from earlier Danish Studies, where occupational codes were normally used to identify the top CEOs. In line with a number of US studies, see e.g. Bell (2005) we use the annual salary to identify the managers. Thus persons getting the highest salaries are assumed to be the persons who are the top CEOs.

The most narrow definition of Top CEOs includes only the person with the highest wage, which is interpreted as the very top CEO of the firm (CEO1). However, many firms have a leadership by a group of CEOs. Therefore we also expand the definition of management to include vice-directors as defined by the top 5 in the wage distribution. Finally a very broad measure of CEOs is introduced in the analysis, namely the group of employees within the top 15 percent of the wage distribution. Of course this definition may include heads of special departments and specialists.

Naturally gross value added is affected by market conditions. Thus entry barriers to the market is approximated by the Minimum efficient scale (MES), which is calculated from the total sample of Danish firms i.e. 20-25000 firms and measured as the first quartile firms' turnover within each industry (measured at the 4-digit level) relative to industry turnover.

Furthermore we control for the influence of market size by including dummy variables for high/low export/turnover rate, which indicates whether the firm has access to

larger markets or not. Table 1 shows summary statistics for all the variables included in the data set

**Table 1. Summary Statistics, 2003.**

	<b>Mean</b>	<b>Std Dev</b>	<b>Minimum</b>	<b>Maximum</b>
<i>Female Proportion:</i>				
Top CEOs (top 1 pay rank)	0.1939	0.1379	0	1
CEOs and vice directors (top 5 pay rank)	0.0639	0.1351	0	1
CEOs, Vice directors and top specialist (top 15% pay rank)	0.1116	0.1164	0	0.8065
Board of directors	0.1062	0.1467	0	0.7142
Board of directors, non staff	0.0765	0.1437	0	0.6667
Board of directors, staff only	0.2145	0.2850	0	1
<i>The share of spouses to male CEOs and vice-directors having a</i>				
Medium long academic education (MVU)	0.2637	0.2306	0	1
Long academic education (LVU)	0.0945	0.1664	0	1
<i>Other firm specific variables</i>				
Gross value added (DKK Mio)	168.2	468.3	-86.3	9943.4
Gross capital	1152.3	7487.1	9.0	194534.1
Number of employees	316.8	871.6	50	20707
Low export 0/1 (less than 10% of turnover)	0.2110	0.4081	0	1
High export 0/1 (more than 50% of turnover)	0.2671	0.4421	0	1
Average age of male CEOs and vice directors	46.6	5.0023	25	63,6
Dummy for listed companies	0.05	0.2356	0	1
<i>Sector dummy-variables, (Manufacturing=0)</i>				
Building and construction	0.0589	0.2356	0	1
Trade, hotel and restaurants	0.3049	0.4605	0	1
Transportation, telecommunication etc.	0.0488	0.2156	0	1
Finance	0.1776	0.3823	0	1

## 5. Results

In order to address the question of whether a higher proportion of women in management affects firm performance, a number of models have been tested. The first column presents the key results from simple OLS regression analysis using the pooled data set from 1996-2003 where each row represents separate analysis of the augmented production function discussed in section 2. The results suggest that a higher proportion of female Top CEOs has a positive influence on firm performance and the same is the case when the CEOs are defined more

broadly. Moreover, the size of the estimated parameters increase when extending the management group to include Top 5 CEOs and Top 15% pay rank persons in the firm.

*Table 2. Regression analysis of equation (1) using various specifications of the proportion of women in management and estimation techniques, 1996-2003<sup>1)</sup>.*

	Dependent variable: Gross value added		
	Pooled OLS	OLS-IV <sup>2)</sup>	Fixed Effect
Top CEOs 1993-2003, top 1 pay rank	0.1937* (0.4335) 0.72 10027	0.1448* (0.321) 0.70 9488	0.0635*** (0.3351) 0.65 10027
Top CEOs and Vice-directors 1993-2003, top 5 pay rank	0.3696* (0.0508) 0.70 10027	0.4604* (0.696) 0.70 9502	-0.0039 (0.0530) 0.64 10027
Top CEOs, Vice- directors and head of departments 1993-2003, top 15% pay rank	0.6881* (0.0552) 0.71 10029	1.2068* (0.1540) 0.70 9545	-0.0405 (0.7837) 0.64 10027

\* denotes that the estimated parameter is statistically different from 0 at the 1% level of significance, \*\* at the 5% level of significance, \*\*\* at the 10% level of significance.

1) Values in parentheses are standard errors of the estimated parameters. Overall R<sup>2</sup>(Adj.) is reported in row 3, and row 4 includes the number of observations in each regression analysis.

2) 2-step procedure, where the proportion of female managers has been 'instrumented'. The instrument equation includes - inter alias - the average age of male CEOs, the share of spouses to male CEOs and vice-directors having an academic education, and the proportion of women in the board of directors.

The causality between the proportion of women in management and firm performance has attracted a massive discussion; see Smith et al (2006). Contrary to the basic hypothesis that a higher proportion of female managers affects the bottom line of the firm positively it has also been argued that firms doing well at the moment can afford to take the risk of hiring alternative (female) CEOs. Thus, the causality can be the reverse where only the most successful firms will tend to hire female managers. In order to take these problems into account we use an instrumental variable estimation technique where the proportion of women in management is estimated before doing the performance analysis

$$(2) \quad GENDER_{it} = \alpha_1 X_{it} + \alpha_2 Z_{it} + v_{it}$$

where  $X_{it}$  is a vector of firm characteristics, time- and sector dummy variables.  $X_{it}$  denotes the instruments which are assumed to have an influence on the proportion of women in management without having any influence on firm performance.  $v_{it}$  is the error component, supposed to be  $Nid(0, \sigma_v^2)$ . Explaining the probability that the Top1 CEO is a women we use a Probit specification and in the Top5 CEO and Top15% equations (2) is estimated by applying a Tobit estimator thereby taking into account the upper and lower limits of the GENDER variable.

In order to find a valid instrument, several variables were tested. A potential instrument, which we assume is independent of firm performance is the average length of education of the spouses of the other CEOs in the firm, see Smith et al. (2006), who argue that male CEOs being married to well-educated spouses have a less traditional view on the competences of female CEOs. Therefore they may be more willing to hire women for positions as CEO as compared to other CEOs who are married to lower educated spouses. A similar measure is the share of the male CEOs' spouses having at least an education at the master level or holding a BA degree. In the final estimations of (2) the two latter instruments were used. Naturally, these instruments can only be used for explaining the proportion of female Top5 and Top15% managers. When estimating the proportion of female Top1 CEOs the share of women in the board of directors was used in combination with the share of women among white and blue collar workers as additional explanatory variable. Both variables affect the probability of having a female top CEO positively, i.e. women in the

board of directors may have preferences for or may just be more open for hiring a female manager. A high share of white and blue collar worker indicates that the working place may be female dominated, which may call for female managers.

We also include the average age of the male Top 5 CEOs (positive significant influence in the instrument equation) and control for firm size (negative significant influence). Finally a number of sector dummies have been included. In general the probability of having a female Top CEO is significantly higher within the service industries as compared to other sectors.

The results of the IV-estimations are shown in the second column. The parameters are positive and highly significant in all three equations and except for the Top15% CEO specification the parameters are fairly robust.<sup>4</sup>

As an alternative to the IV estimations column 3 shows the results from analyses where we use fixed effects estimation methods.<sup>5</sup> Except for the Top1 CEOs the coefficients become insignificant. In this case the influence from female Top CEOs becomes negative at exactly the 5% level of significance.

Summing up, the results seem to reject a hypothesis of reverse causality. But the results should be interpreted with care. The significantly positive coefficients in the pooled OLS estimations, but insignificant panel estimates in all the fixed effect estimations (except for one negative and positive case), may perhaps reflect that the firms with a large proportion

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<sup>4</sup> Comparing the instrument equations the degree of explanation is much lower when explaining CEO Top15% as compared to CEO Top5 or CEO Top1.

<sup>5</sup> Tests were made between fixed vs random effects models but in all cases the random effects model specification was rejected. Furthermore experiments were also made by combining the FE and IV approach noting that each method to some extent controls for the same problems whereby this method is questionable. The estimated parameters stay insignificant for the CEO Top5 and CEO Top15%. However the estimated parameter in the CEO Top1 equation turns negative significant at exactly the 5% level of significance.

of women are the firms being most progressive and ambitious.<sup>6</sup> If such firms characteristics are time constant, more women may be hired in top management at the same time. Thus a more ambitious recruitment policy may go together with other characteristics which is not observed (family friendly working environment, high degree of team spirit, good dialog between the employees at all levels etc.). That may at the same time explain firm performance.<sup>7</sup>

The female representation in the board of directors has recently attracted a huge attention. As mentioned above some countries have quotas for the proportion of women in the board, e.g. Norway, where the proportion of women in firms with more than 50 employees must be at least 40% according to law. Note that, up to this decision Böhren and Ström (2005) found a negative influence from the proportion of women among boards of directors and firm performance for listed non-financial firms in Norway, see the former section. Note that our sample also includes non-listed firms and the influence on firm performance from the female representation in the board of directors is shown in the first row in table 3. Contrary to e.g. Böhren and Ström (2005) we find that there is a positive influence from more women in the board. However this is only the case in the pooled OLS estimations. Using the firm fixed effect method the influence becomes non significant.<sup>8</sup>

Contrary to the majority of other studies we also have information on whether board members are staff members or not. Assume that women selected to be in the board of directors by their colleagues are selected because of qualifications. Next assume that more

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<sup>6</sup> One major problem in the FE estimations, which may cause insignificance, is lack of enough variation for the proportion of women in management over time. The IV estimation form does not suffer from this problem.

<sup>7</sup> See Smith et al (2006) for a more detailed discussion.

<sup>8</sup> Sandøy et al (2006) find no influence from female members of the board of directors on performance for 459 listed Scandinavian firms. However board members are not separated into staff and non-staff and furthermore listed companies are most likely non-representative for Scandinavian firms in general. This is also a potential problem in Böhren and Ström (2005).

diverse boards are beneficial to firm performance then a positive influence is expected contrary to the situation where ordinary members may be selected due to family ties to the owner. The pooled OLS estimations seem to support this view.<sup>9</sup>

*Table 3. Regression analysis of using various specifications of the proportion of women in the board of Directors, 1996-2003<sup>1)</sup>.*

	<i>Dependent variable: Gross value added</i>	
	Pooled OLS	Fixed Effect
Board of Directors	0.1174* (0.0407)	-0.0094 (0.0406)
	0.70 9517	0.62 9517
Non-staff Members of the Board of Directors	-0.0700 (0.0731)	0.0970 (0.0791)
	0.71 4856	0.63 4856
Staff-members of the Board of Directors	0.1374* (0.0302)	-0.0069 (0.0312)
	0.71 4856	0.63 4856

\* denotes that the estimated parameter is statistically different from 0 at the 1% level of significance, \*\* at the 5% level of significance, \*\*\* at the 10% level of significance.

1) Values in parentheses are standard errors of the estimated parameters. Overall R<sup>2</sup>(Adj.) is reported in row 3, and row 4 includes the number of observations in each regression analysis.

## 6. Conclusion

In this paper we present new evidence on the influence on firm performance of gender diversity in management. Moreover using data for Danish companies it is tested whether a higher proportion of women in management has an influence on performance as measured by gross value added. According to the theory the influence of diverse boards on firm

<sup>9</sup> This result is in accordance with earlier evidence, see Smith et al (2006). Experiments were made by selecting firms with more than 250 and 500 employees because the larger firms may have boards independent of family ties. However the results were quite similar to the results shown in table 3.

performance can be positive as well as negative and consequently the existing empirical evidence is mixed.

Using a rich employer-employee data set which includes Danish firms with a least 50 employees over the period 1996-2003 we construct various measures of female representation in the top of the firm, i.e. Top CEO, Top 5 CEOs, Top 15% CEOs and the Board of Directors – based on the salaries. Basically our results depend on the estimation method that is used, i.e. the influence on performance is highly significant and positive for all definitions of managers when using OLS and OLS-IV techniques, which is normally used in other studies. However allowing for firm fixed effects eliminates the significance except on two occasions giving both a negative and a positive parameter if the Top CEO of the firm is a woman.

Focusing on the influence of more women in the board of directors the OLS results suggest that female board members have a positive influence on performance. But this effect is driven by the staff members. Non-staff female members of the board do not seem to affect firm performance, maybe because family ties for this group in some cases are more important than qualifications. Extending the analysis by the use of firm fixed effect estimation methods eliminates the effects.

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