Women on CEO-Only Boards and ROAA

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Women on the Board (WOB) have been increasing both in the United States and Europe and much of the research to date is not U.S. focused. This paper studies the impacts of WOB on Return on Average Assets (ROAA). We employ different panel data models to investigate the impacts on 145 S&P 500 CEO-only board companies between 2016 and 2019. CEO-only board companies have a type of board that developed as a result of the Sarbanes-Oxley Act of 2002 to be a fully independent board other than the CEO. Our results illustrate positive impacts of WOB on ROAA when controlling for sector, time and state fixed effects. Moreover, interest rate has a positive and statistically significant impact on ROAA. Additionally, we study the cultural impacts of Red vs. Blue states. Our results support a positive impact of WOB on ROAA in favor of Blue states.

Keywords: CEO-only board, females on the board, ROAA, Return on average assets, WOB, women on the board

INTRODUCTION

Women on the Board (WOB) is a current topic in research as to the effect women have on the board in many areas including performance. Recent studies have demonstrated the positive effects of WOB on firm performance, firm risk, and operating profit (Bukalska, Sosnowski, & Wawryszuk-Misztal, 2024; Arayssi, Mustafa, & Jizi, 2016). Stone and Koyleni (2022) studied women on boards for CEO-only boards, which are boards with only the CEO as a company insider, using data from the S&P 500 for the year 2015. The research examined sustainability reporting and performance, specifically return on assets (ROA). CEO-only boards are thought to have essentially blocked the favorable impact of the agency protection for shareholders due to the ever-powerful only insider the CEO (Joseph, Ocasio, & McDonnell, 2014). Faleye (2015), showed CEO-only boards exhibited lower financial results versus non-CEO only boards. The study here focuses on the finding from the research by Stone & Koleyni (2022) that showed a positive relationship between ROAA (using Return on Average Assets) and women on CEO-only Boards, possibly mitigating the powerful CEO-only BODT (Board of Director Type) and extends the research for the years 2016-2019 in order to assess the results.

THEORY AND RESEARCH

Women on Boards (WOB)

The WOB increased over the last 10 years, but a sudden decrease in the US emerged in 2021,nd now that trend is reversed (Chen, 2025). Meanwhile, new European mandates for WOB will go into effect in 2026 requiring increases to WOB (Peluso, 2022). Some European countries mandated higher levels than others. Six EU Countries have followed up on the action and France, Italy and Netherland have enacted higher legislation for WOB (these countries show more dramatic increases of WOB, while 10 others have more moderate requirements still showing increases to WOB) (Barosso, Daun, Guo, & Kowalewski, 2024). In the United States, WOB is not mandated. However, California passed laws requiring board diversity that were deemed unconstitutional by Federal courts (Umanah & Ramonas, 2023). The percentage of WOB in the United States initially increased, then decreased (possibly due to concerns related to the Diversity Equity Initiative and is now increasing again (Chen, 2025). For example, the Russel 3000 has increased a small amount from 29.7 to 30.3 percent in comparable first quarters 2024 vs. 2025 across all states. Currently, first place in WOB- California dropped to eighth place while Oregon rose to number 1 at 39.5 percent (California has the highest number of companies in the Russel 3000 and a WOB percentage of 33.6) (Chen, 2025). Due to the increases and changes in WOB throughout both the United States and Europe, considering effects on company performance should interest shareholders and stakeholders.

WOB and Financial Performance

Current research on WOB and financial performance yields somewhat inconclusive results (Bukalska et al., 2024). The authors stated that findings in this area can be helpful for management in decision-making, so further research is encouraged. The authors found a positive relationship between operating efficiency and WOB percentage for Visegrad (comprising Poland, the Czech Republic, Slovakia, and Hungary) companies, but none related to market share (Bukalska et al., 2024). Furthermore, the authors also suggested that one lesson from the research is to look at the cultural aspects of countries where research is conducted (Bukalska et al., 2024).

The authors, Bukalaska et al., 2024, found that countries with greater cultural focus on masculinity had lower numbers of WOB. Similarly, the structure of the power construct in a country if tightly controlled (concentrated power) reduces diversity on the board (Young Ahn & Cunningham, 2017). With this in mind, it may also be important to consider both cultural aspects and the political climate when studying WOB in various countries or states. In the United States, it is commonly recognized that there are cultural differences between the Red and Blue States, so it may be important to consider these impacts when evaluating data from a nation U.S. perspective (Baumgartner, Francia, Morris, & Scavo, 2008).

In the same vein, another study found that women directors enhance firm economic and market success after adjusting for patriarchal attitudes in companies, as reported in search using information from over 1100 listed companies in European Countries (Castro, Tascon, & Corral, 2023). Then, in 2025, researchers found that including WOB is advised to increase performance in the insurance industry in Europe (Morales de Vega, García-Centeno, & Palomo-Zurdo, 2025). The study used data from 2013 to 2023 to consider the impact of WOB and women chairs on both ROA and ROE, finding that both female chair/CEO and higher WOB percentage increase performance and returns by 3% in that order.

An earlier study found financial performance (TobinQ)- a ratio comparing market value to the cost to replace assets- is positively correlated with the greater presence of women on boards in Spanish Stock Exchange companies (Del Carmen Valls Martínez & Cruz Rambaud, 2019). In contrast, a 2009 study of US companies found a negative relationship between WOB and average performance, although firms with weak governance benefited from WOB (Adams & Ferreira, 2009). Another study, focusing on U.S. manufacturing firms and using data from 2001 to 2007, found no significant relationship between WOB and firm performance (He & Huang, 2011). The earlier study results may have been affected by the overall low percentage of WOB in the time period used.

Current research is not U.S. focused. The current study builds on the work of Stone and Koleyni (2022), which examined the impact of WOB on CEO-only boards in U.S. companies. Their research, using 2015

data, found a statistically significant positive relationship between WOB and Return on Average Assets (ROAA) at the 10% level. The current study extends that analysis by considering an expanded time period (2016–2019) and introducing a cultural aspect: it uses Red and Blue state classifications from the 2016 U.S. presidential election as a proxy for cultural attitudes that may affect board make-up and performance measures.

CEO-Only BODT

In the early 2000's the CEO-only board, a type of board where the CEO is the only company member on the board vs. earlier structures that allowed other inside members on the board, effectively silenced all corporate employees except the now more powerful CEO and became the go to structure for public boards in the United States (Faleye, 2015). The creation of the CEO-only board was an elaboration due to the Sarbanes-Oxley Law that addressed scandals like Enron, for example.

Joseph et al. (2014) examined 27 years of data on Fortune 500 companies and discovered that the change in boards to fully independent had the opposite effect of the expected agency protection, instead removing the voices of other corporate insiders and creating a more powerful and autocratic CEO. Powerful CEOs, similar to those who hold dual roles as CEO and chairperson, may have negative impacts on sustainability efforts, for example. In contrast, CEOs with less autocratic stature may focus on these types of investments (Jiraporn & Chintrakarn, 2013). Surprisingly, Zhu, Husnain, Ullah, Kahn and Ali, (2022), found that the CEO autocratic effect on a board without other corporate officers was reduced with women on the board. Stone and Koleyni (2022) found a positive relationship between women on CEO-only boards and ROA using S&P 500 data from 2015. This study expands the data for four years to investigate whether the relationship remains over time.

Agency Theory

In the 2000s, after the Sarbanes-Oxley Act, boards became independent and morphed into the CEO-only format supported by agency theory; however, the powerful CEO remaining on the board as the only insider may have instead negated the positive impact of agency theory (Joseph et al., 2014). WOB supports the protection of agency theory for shareholders due to the increase in independence that diversity supports and the addition of women, highlighting the impact of good corporate governance in Indonesian listed stock companies (Hesniati, Vernando, Haryanto, & Arviano, 2024). WOB supports wise risk taking on corporate boards and can lead to better performance, on ROA and Market to Book Ratio, at increasing levels of WOB. In addition, Jirapon and Chintrakarn (2013) determined that WOB may play a role in offsetting the powerful CEO's influence in restoring the agency for shareholders. Stone and Koleyni (2022) found a positive relationship between WOB and ROA on CEO-only boards, thereby protecting shareholders and supporting the agency. The paper here will expand the study to determine if the relationship holds for the following four years.

PURPOSE OF STUDY

The research examines the relationship between ratio of WOB and ROAA by sampling CEO-only BODT companies from the S&P 500 for the years 2016-2019. ROAA was gathered and calculated from the SEC information for 2016-2019 reporting periods. The study extends the previous research by the authors where there was shown a positive relationship between WOB and ROAA at a 10% significance (Stone & Koleyni, The Impact of Women Board Members on ROA and Sustainability in CEO-Only Boards, 2022).

Research question is displayed below:

RQ1: *Does ratio of women on the CEO-only board relate to ROAA computed from the annual report?*

RESEARCH DESIGN AND METHODOLOGY

Archival data is used similarly to Lock & Seele (2015). Additionally, the same approach was used in Stone (2018, 2020). The immediate prior study continued the use of archival data (Stone & Koleyni, The Impact of Women Board Members on ROA and Sustainability in CEO-Only Boards, 2022). Siblis Research had the available data for the S&P 500 listings for 2015, the first year of the Stone study, and this list was used to movehe research forward (Siblis Research, 2025). WOB SEC data was gathered from the financial and proxy reports over the time period in the study (SEC, 2025). The ROAA (return on average assets) and home office state was calculated or gathered from the same reports. The information about Red and Blue States was gathered based on 2016 presidential elections results. The first study by Stone (2018) segmented the listing of companies into CEO-only and non-CEO-only, but only the CEO-only data was used here.

Population, Sample and Data

In the original study 343 CEO-only companies were sampled and coded (Stone, 2018). In the same study, ROAA data was gathered from the SEC. Here, the ROAA data was computed using the same method, pulling data and performing calculations from the SEC reports for the years 2016-2019 (SEC, 2025). The same random sample of 222 out of 343 used in the previous study was employed in this study, with updates made as necessary (Stone & Koleyni, The Impact of Women Board Members on ROA and Sustainability in CEO-Only Boards, 2022). Ultimately, since data were gathered over a four-year period, companies that did not maintain the same characteristics throughout the period were eliminated. For example, if a company merged or otherwise ceased operations or had discrepancies in its annual reporting formats, it was dropped from the data. As a result, the final data used included 145 CEO-only companies for the years 2016-2019. Also gathered information on State of home office-from the annual reports, sectors and Red and Blue States.

Measurement

The study codes data from proxy and annual reports from the SEC (SEC, 2025). S&P 500 data is excellent data due to valid applications to other comparable companies (S&P 500, 2025). The requirements for listing on the S&P 500 include large balance sheet amounts and current stock trading requirements.

Operational Definition of Variables

Variables used in this study are formulated and defined as follows:

- Ratio of Women on the Board: $\frac{Number\ of\ Women\ on\ Board}{Total\ Board\ Members}$
- ROAA: $\frac{Net\ Income_t}{\frac{Total\ Assets_t + Total\ Assets_{t+1}}{2}}$
- Sector: Companies are categorized based on S&P 500 11 sectors (S&P 500, 2025)
- Company: 145 CEO-only companies are included.
- Interest Rate: Federal Funds Effective Rates gathered from FRED (Federal Reserve Bank of St. Louis, 2025).
- Time: 2016-2019
- State: States using companies' headquarters
- SEC: financial and proxy report (SEC, 2025).
- Red and Blue State: Based on 2016 U.S. Presidential Results.

DATA COLLECTION AND ANALYSIS

Statistics

The study used both fixed and random effect panel data models and also performed the Hausman test to choose the best model. Moreover, we ran all models again by controlling for the interest rate[1]. The fixed effect models control for the following: Company, sector, time, state. We also investigated the impacts of red versus blue states on ROAA.

Coding

For the study, information was gathered and coded for companies from the S&P 500 listing originally used in the previous study (Stone & Koleyni, The Impact of Women Board Members on ROA and Sustainability in CEO-Only Boards, 2022). The coders used both Def 14 (Proxy Reports) and the annual reports for the study years (SEC, 2025). The information gathered included the total number of board members and the number of women on the board. The coders then calculated the ROAA using data pulled from the annual reports. The coders also gathered information regarding the company and state by pulling data from the corporate office'snnual report (SEC, 2025). Additionally, using the presidential election results from 2016, the states were coded as either Red or Blue States. The coders sampled their work and cross-checked the information to assure that the errors if any were immaterial.

Methodology

To assess the influence of WOB on ROAA we used different versions of following panel data:

$$Y_{ijt} = \alpha + \eta_i + \delta_t + \gamma_j + \beta X_{ijt} + e_{ijt} \quad (1)$$

where Y_{it} is ROAA for company/industry *i* at time *t* in state *j*. X_{ijt} is the explanatory variable such as WOB or interest rate, η_i is the company/sector fixed effect, δ_t is the time fixed effect, γ_j is the state fixed effect, and e_{ijt} is the stochastic error term.

Assumptions, Limitations and Delimitation

This study is impacted by the availability of the data. The size of panel can increase in the future studies to include covid and post covid eras. Also, data for other variables such as Debt-to-Capital, Debt-to-Equity ratio and Asset Turnover which impact ROAA is not available. Accordingly, one should be cautious in generalization of the results to periods out of the sample. However, the study contributes to the literature by using various panel data models with different control variables to answer the important question of the impacts of WOB on ROAA.

Results

Table 1 shows the results of different panel data estimations. Panel A illustrates the impacts of WOB on ROAA when we use various random and fixed effect panel data models. Panel B shows the same specifications when we control the interest rate. Both random effect results in specifications (1) and (7) support positive effects of Woman on Board on ROAA but they are not statistically significant. In model (2) when we control for company's fixed effects the sign is positive but it is not statistically significant. In specification (8) the sign changes to negative and is still statistically insignificant for WOB but it is significant for interest rate. Using two-way fixed effect in models (3) and (9), when we control for both company's and time fixed effects the sign is negative which supports that WOB has negative impacts on ROAA but it is not statistically significant. Models (4) and (10) show positive impacts when instead of controlling for company's fixed effects we control for sector's fixed effect. Using three-way fixed effect in models (5) and (11) the impact of WOB is negative and insignificant, when we control for company, time and state fixed effects. However, when we control for sector, time, and state fixed effects in equations (6) and (12), the impacts of WOB on ROAA become positive and statistically significant at the 5 percent level.

TABLE 1
PANEL DATA RESULTS

ROAA				Panel A		
Models	(1) RE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Ratio of Woman on Board	0.064 (0.053)	0.040 (0.068)	-0.007 (0.075)	0.092 (0.063)	-0.007 (0.063)	0.111** (0.047)
Observations	578	578	578	578	578	578
R-squared	0.0104	0.70	0.70	0.19	0.70	0.30
Company FE	No	Yes	Yes	No	Yes	No
Sector FE	No	No	No	Yes	No	Yes
Time FE	No	No	Yes	Yes	Yes	Yes
State FE	No	No	No	No	Yes	Yes
Number of Companies	145	145	145	145	145	145
Number of Sectors	11	11	11	11	11	11
				Panel B		
Models	(7) RE	(8) FE	(9) FE	(10) FE	(11) FE	(12) FE
Ratio of Woman on Board	0.033 (0.051)	-0.014 (0.066)	-0.007 (0.061)	0.092 (0.063)	-0.007 (0.063)	0.111** (0.046)
Interest Rate	0.006 (0.004)	0.007* (0.004)	0.007* (0.004)	0.003 (0.003)	0.006* (0.003)	0.003 (0.005)
Observations	578	578	578	578	578	578
R-squared	0.0086	0.71	0.71	0.76	0.71	0.31
Company FE	No	Yes	Yes	No	Yes	No
Sector FE	No	No	No	Yes	No	Yes
Time FE	No	No	Yes	Yes	Yes	Yes
State FE	No	No	No	No	Yes	Yes
Number of Companies	145	145	145	145	145	145
Number of Sectors	11	11	11	11	11	11

Notes: Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% level, respectively. Numbers in parentheses are *robust standard errors*.

We also run the Hausman test to check whether fixed or random effect models outperform. Table 2 shows the results of Hausman test. According to table 2 we cannot reject the null hypothesis that the preferred model is random effects. This means that we should use our random effect models.

TABLE 2
HAUSMAN TEST RESULTS

	Statistic	Pr > ChiSq
Ratio of Woman on Board	0.82	0.3641
Ratio of Woman on Board with Interest Rate	1.97	0.3733

Null hypothesis: random effect model is preferred.

Accordingly, models (1) and (4), which are random-effects models, show that the impact of Woman on Board on ROAA is positive.

We also use LM test to decide between the random effect model and a simple OLS regression. Table 3 illustrates the results. Since both statistics are significant, random effect model should be used.

TABLE 3
LM TEST RESULTS

	Statistic	Pr > ChiBarSq
Ratio of Woman on Board	310.28	0.0000
Ratio of Woman on Board with Interest Rate	311.76	0.0000

Null hypothesis: variances across companies is equal to zero (no panel effect).

Moreover, we run a random effect panel data to check the impact of blue vs. red states. As our results in table 4 show blue states has a positive impact on ROAA and it is statistically significant at 1 percent. The impact of WOB remains positive, although it is not statistically significant.

TABLE 4
BLUE VS. RED STATES

ROAA	(13)
WOB	0.021
	(0.047)
Interest Rate	0.006*
	(0.003)
Blue States	0.035***
	(0.011)
Constant	0.027**
	(0.013)
Observations	578
R-squared	0.075

Notes: Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% level, respectively. Numbers in parentheses are *robust standard errors*.

FINDINGS AND CONCLUSIONS

In summary, the findings show positive results for WOB when using the following: in equations (6) and (12)- see tables above- controlling for sector, time and state fixed effects the impacts of WOB on ROAA become positive and statistically significant at 5 percent, random effect results in specifications (1) and (7)- see tables above- support positive effects of Woman on Board on ROAA but they are not statistically significant and when in model (2)-see tables above- we control for company's fixed effects the sign is positive but it is not statistically significant and finally models (1) and (4)-see tables above- which are random effect models show that the impacts of Woman on Board on ROAA are positive.

Other models show negative results but are not significant. So, for the discussion here we focus on the tables above, 6 and 12, controlling for sector, time and state fixed effects that show impacts of WOB on ROAA as significant at 5% aligning with the earlier results shown in the previous study (Stone & Koleyni, The Impact of Women Board Members on ROA and Sustainability in CEO-Only Boards, 2022). The research shows that considering the possible impacts of geographic or state information, time, and industry sector, women on the board have a positive effect on Return on Average Assets. Companies must consider the positive association of WOB and their returns. Additionally, the study considered the cultural impacts using Red and Blue states, which showed a positive outcome for WOB and ROAA, although not at a statistically significant level. In addition, the impact of Red vs Blue states was significant, Blue being

positive as to ROAA. However, consideration must be given to size of companies and development in Red vs. Blue states. Further research would be interesting as to smaller companies and impacts on WOB and ROAA for Red vs. Blue States. For companies, the takeaway may be considering the overall culture of the company and its operating state, as well as any cultural and legal differences that may arise from practicing in the state. This includes preferences for constructing the board, as they relate to ROAA.

RECOMMENDATIONS FOR PRACTICE AND FUTURE RESEARCH

For future studies, we recommend expansion of the panel to include covid and post covid eras. Also, depending to availability of data, it is recommended for future studies to include more control variables. Moreover, we recommend considering the impact of Blue vs Red states for later years such as after 2020 and 2024 elections.

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ENDNOTE

1. We considered adding other control variables impacting ROAA such as Debt-to-Capital Ratio, Debt-to-Equity Ratio, or Asset Turnover but data was not available.

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