Impact of the Gender Diversity on the stock prices in the Metal and Mining sector

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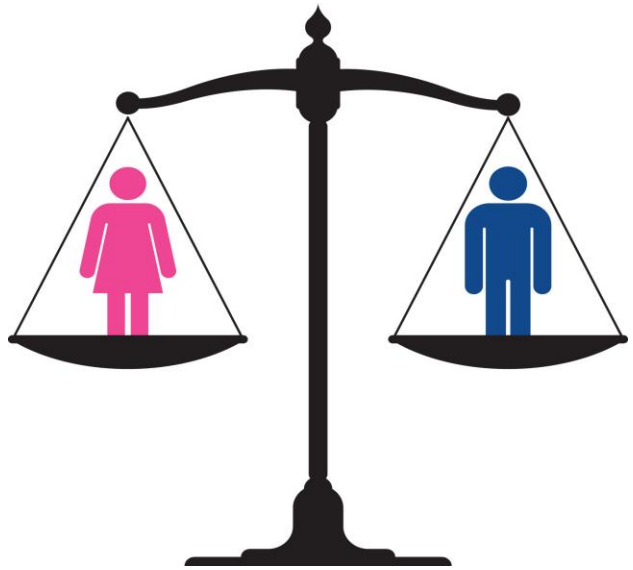
Financial econometrics

I. Introduction

- Gender diversity = key driver of **economic & financial performance**
- Linked to **ESG criteria** — crucial for **investor attractiveness**

- **Mining sector:** male-dominated (15–20% women) → strong test case
- Study on **6 major mining firms (2015–2025)**
- **Research question:**
  → How does gender diversity affect **market valuation**?

- Key theories:
  - **Human Capital (Becker, 1964):** more talent = better performance
  - **Signaling (Akerlof, 1970):** diversity sends positive signal to investors



- **Findings from literature:**
  - +15% profitability (Aguirre, 2012)
  - +35% GDP potential (IMF, 2018)

- **Implications:**
  - For leaders: diversity = strategic asset
  - For investors: relevant ESG indicator
  - For regulators: diversity policies = economic benefits

BHP Group
Rio Tinto
Vale S.A.
Freeport-
Anglo American
McMoRan
Glencore

II. Literature review and hypothesis

- Early studies: women on boards → Recent focus: **diversity across all levels**
- Main theories:
  - **Human Capital** → productivity & innovation
  - **Signaling** → investor confidence
  - **Resource-Based View** → competitive advantage

- Empirical results:
  - Most studies → **positive link** between diversity & performance
  - Mixed outcomes depending on context (Dezsö, 2012; Hoogendoorn, 2013)
- In mining: women = **15–20%** of workforce → evidence still limited
- **Hypothesis (H1):**
  → Higher % of women → **higher market valuation**
- Tested with **econometric model (2015–2025)** on 6 mining firms

III. Sample and model

- A) Data

The original data for “Gender_D”, Ln_Tassets and “ROA” were collected from Bloomberg and then transformed into monthly frequency to better capture short-term variations in stock market behavior.

$$y_t = y_n + \frac{t - \text{start of year } n}{\text{end of year } n - \text{start of year } n} \times (y_{n+1} - y_n)$$

Transposition in excel of the linear interpolation formula using the function VLookup to automatize it:

```
=VLOOKUP(YEAR($B4);$N$3:$T$13;2;FALSE)+
(VLOOKUP(YEAR($B4)+1;$N$3:$T$13;2;FALSE)-VLOOKUP(YEAR($B4);$N$3:$T$13;2;FALSE))
*(MONTH($B4)/12)
```

B) Variables

- Dependent variable: “Stock_P”: represents the adjusted monthly stock price of each company.

- Independent variable:

  - Variable of interest: **Gender_D**: a percentage from 0% to 100% measuring the level of women in total workforce of a company.

  - Control variables: **Ln_Tassets**: the natural logarithm of total assets, used to control firm size and scale effects.

ROA: the return on assets, representing profitability and internal performance efficiency.

Model Specification

C) Model Specification

- To empirically test the relationship between gender diversity and stock prices, the following econometric model is used:

$$\textbf{Stock\_P} = \beta_0 + \beta_1 \textbf{ Gender\_D} + \beta_2 \textbf{ Ln\_Tassets} + \beta_3 \textbf{ ROA} + u$$

where:

- "u" is the error term capturing unobserved factors.
- The coefficient "β1" measures the marginal impact of gender diversity on stock price performance, controlling company size and profitability.

IV. Results and discussion

A) Sample Analysis

Table 1: presents the descriptive statistics of the main variables for the six mining companies, aggregated, observed between 2015 and 2025.

- The average stock price (Stock_P) is relatively high, reflecting the large capitalization of the selected firms, but with substantial dispersion due to the cyclical nature of the mining industry.
- The gender diversity index (Gender_D) has a low mean, confirming that women remain underrepresented in the sector.
- The average logarithm of total assets (Ln_Tassets) indicates the presence of large multinational groups

Variable	Description	Observations	Mean	STDEV
Stock_P	Monthly adjusted stock	726	383,5786611 $	756,46
Gender_D	Percentage of women in the workforce	726	19,15(%)	6,07
Tassets	Log of total assets	726	140236,3617 $	131569,29
ROA	Return on assets (%)	726	5,86(%)	7,09

B) Regression Results

B) 1. Global Model Result

- The following econometric model was estimated:

$Stock\_P = \beta_0 + \beta_1\ Gender\_D + \beta_2\ Ln\_Tassets + \beta_3\ ROA + u$

- Before discussing the coefficient and the significatively of all variables it is important to analyze the general info about the model given by the regression.
- First, the coefficient of determination (R^2) equals 0.833, which means that approximately 83.3% of the variance in the dependent variable is explained by the combined effect of diversity, firm size, and profitability.
- In social sciences and corporate finance research, an R^2 of this magnitude is considered excellent.
- Secondly there the F-statistic with a significance level of 5,56E-45, a really low F-statistic imply that our model is significant and that it is extremely unlikely that the observed relationships occurred by chance

Regression Statistics						
Multiple R	0,91					
R Square	0,83					
Adjusted R Square	0,83					
Standard Error	390,14					
Observations	120,00		0,833466836			
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	3,00	88 364 969,27	29 454 989,76	193,52	0,00	
Residual	116,00	17 656 008,90	152 206,97			
Total	119,00	106 020 978,17				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-6 814,61	1 700,47	-4,01	0,00	-10 182,60	-3 446,62
Gender_D	40,75	2,71	15,06	0,00	35,40	46,11
ln(T_Assets)	60,52	22,82	2,65	0,01	15,31	105,73
ROA	7,16	1,52	4,72	0,00	4,16	10,17

B) 2. Variable Analysis

Variables	Coefficients	t Stat	P-value	R^2(adjusted)	observations
Intercept	-6814,61	-4,01	0,00	0,82916	120
gender_D	40,75	15,06	0,00		
ln(T_Assets)	60,52	2,65	0,01		
ROA	7,16	4,72	0,00		

The regression results are summarized below:

- The **Gender_D coefficient is positive**, showing a positive impact of gender diversity on stock price performance
- **Highly significant statistics** (t = 15.06; p < 0.001) confirm a **strong positive relationship**
- The **low p-value** means the result is **very unlikely due to chance**
- Conclusion: **gender diversity has a positive and statistically significant effect** on firm performance in the mining sector
- **Ln_Tassets** and **ROA** also have **positive and significant coefficients**
- Larger and more profitable firms are **rewarded by investors with higher stock prices**
- All variables (Gender_D, ROA, Ln_Tassets) have **p-values < 0.05**, confirming significance
- The **intercept has no economic meaning**; it only represents the model's starting point on the graph

IC95%=[35.39;46.11]

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B) 3. Discussion and interpretation

- These results confirm our hypothesis, which posits that gender diversity positively influences the market valuation of mining companies. The positive coefficient of Diversity implies that investors value companies promoting gender inclusiveness, likely perceiving them as more modern, better managed, and aligned with ESG principles.
- The findings are consistent with human capital theory (Becker, 1964), which emphasizes that diversity enhances the effective use of talent and improves productivity. They also align with signaling theory (Akerlof, 1970), which suggests that gender equality policies send a positive signal to investors about governance quality and long-term vision.
- The magnitude of the ROA coefficient confirms that internal profitability remains a crucial determinant of market performance, while firm size (Ln_Tassets) strengthens investor confidence due to perceived financial stability and operational resilience.

V. Conclusion

- Performance in the mining sector depends not only on financial factors (size, profitability) but also on social and structural aspects like gender diversity.
- Hypothesis H1 is confirmed: a higher percentage of women in mining companies positively and significantly impacts market valuation.
- The strength and significance of the results show that social inclusiveness plays a key role in firm performance.
- Supports modern corporate governance theories emphasizing the value of diversity.
- In practice, mining companies can enhance performance by adopting policies that promote gender equality and inclusion.

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