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

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**Abstract**:
This econometric study investigates the impact of gender diversity on the market valuation of mining companies between 2015 and 2025. Using monthly panel data from six major global firms (BHP Group, Rio Tinto, Vale S.A., Freeport-McMoRan, Anglo American, and Glencore), the analysis examines whether a higher proportion of women in the workforce contributes to improved stock performance. The model includes gender diversity as the key explanatory variable, controlling for firm size (log of total assets) and profitability (ROA). Results reveal a strong, positive, and statistically significant relationship between gender diversity and stock prices (t = 15.06; p < 0.001), suggesting that investors value inclusiveness as a signal of effective governance and ESG alignment. The findings support human capital and signaling theories, highlighting that gender diversity can enhance both corporate reputation and financial outcomes. These results underscore the strategic importance of diversity policies in traditionally male-dominated industries such as mining.

## I) Introduction

Gender diversity within companies is now recognized as a major issue, not only socially, but also in terms of economic and financial performance. While most studies focus on the representation of women in management positions, this research takes a broader approach by examining the influence of gender diversity at all hierarchical levels on companies' market valuation.

In a context where environmental, social, and governance (ESG) criteria are becoming increasingly important in investment decisions, understanding the real impact of gender diversity on market valuation is becoming crucial for companies seeking to improve their attractiveness to investors.

The mining sector, traditionally dominated by men, offers a particularly interesting field of study to assess this impact. While the healthcare sector employs most women (60-70%), the mining and metals sector remains one of the least diverse with only 15-20% women, well below sectors such as technology (30-35%) or finance (40-45%). So, in this sector where women generally represent a minority of the workforce, progress in gender diversity could send a strong signal to the financial markets, thus influencing investor perceptions.

This study focuses on six major listed mining companies (BHP Group, Rio Tinto, Vale S.A., Freeport-McMoRan, Anglo American, and Glencore) over the period 2015–2025, using a composite gender diversity index that considers not only the representation of women in management positions, but also their presence at all hierarchical levels.

The central question of this study is therefore:

To what extent does gender diversity influence the stock market valuation of mining companies?

This question is part of a broader debate on the role of social factors in companies' financial performance. Several economic theories can shed light on this relationship. Human capital theory (Becker, 1964) suggests that a diverse workforce allows for better exploitation of available talent and therefore improve productivity and overall company performance. There is also the signaling theory (Akerlof, 1970) indicates that companies that actively promote diversity send a positive signal to investors, improving their reputation and attractiveness in financial markets.

Recent empirical studies shed additional light on this relationship. Aguirre et al. (2012) showed that companies with greater gender diversity have 15% higher profitability than their less diverse competitors. Similarly, the IMF (2018) highlights that reducing gender inequality could increase GDP by 35% in emerging countries, suggesting that gender diversity could have significant economic benefits at the microeconomic level.

So, there are a lot of statement that draw positive correlation between the number of women in a company and the earnings. To challenge these statements, this study uses

an econometric model based on annual data converted into monthly data covering the period 2015–2025. In addition to the % of women working, dependant variables include traditional financial performance indicators, such as return on assets and tangible asset. The results of this analysis could have major implications for business leaders, investors, and regulators. For leaders, this could demonstrate that diversity policies are not only a matter of compliance or social responsibility, but also a strategic lever to improve stock market valuation. For investors, particularly those integrating ESG criteria into their decisions, this study could provide empirical evidence that gender diversity is a relevant indicator of a company's future performance. Finally, for regulators, these results could support the idea that public policies promoting diversity could have positive economic impacts, beyond their social benefits.

## II)     Literature review and Hypothesis

The relationship between the percentage of women in companies and their market valuation has been the subject of a lot of research in recent decades. While first studies mainly focused on female representation on boards of directors, recent work has increased the scope to include the proportion of women in the overall workforce. This shift reflects a growing awareness of the importance of diversity at all organizational levels.

Several economic theories offer potential explanations for this link. Human capital theory (Becker, 1964) suggests that a more diverse workforce can mobilize a broader talent pool and therefore improve productivity and innovation. In sectors such as mining, where technical skills and resilience are crucial, a higher proportion of women could bring varied perspectives to solving complex problems. Signaling theory (Akerlof, 1970) posits that companies employing a higher proportion of women send a positive signal to investors, improving their reputation and attractiveness in financial markets. Finally, resource-based theory (Barney, 1991) considers that diversity can be a source of competitive advantage by allowing companies to access unique resources.

Empirical studies on this topic are numerous but present mixed results. A meta-analysis by Post and Byron (2015) reveals that 60% of studies find a positive impact of gender diversity on performance, while 20% find no significant effect and 20% a negative effect. Carter et al. (2003) show that companies with higher female representation on their boards have a 15% higher market value. Erhardt et al. (2003) find a positive correlation between gender diversity and financial performance, although this effect varies by sector. Aguirre et al. (2012) extend this analysis to the entire workforce, showing that companies with greater gender equality have 15% higher profitability.

However, these results are not universal. Dezsö and Ross (2012) point out that the impact of diversity depends on the organizational context, sometimes leading to increased conflict. Hoogendoorn et al. (2013) show that the benefits of diversity are more pronounced in innovative sectors. In the mining sector, where women represent

only 15-20% of the workforce (ILO, 2021), quantitative evidence of the impact on stock market valuation remains limited, although McKinsey (2020) notes an improvement in the image of more diverse mining companies. Based on this review, we formulate the following main hypothesis:

H1: An increase in the percentage of women in the workforce of mining companies has a positive and significant impact on their market valuation.

This hypothesis will be tested using an econometric model using monthly data from 2015 to 2025 for six major mining companies. The results could have important implications for managers, investors, and regulators, suggesting that policies aimed at increasing the percentage of women could be a strategic lever for improving market valuation.

## III)     Sample and Model

### III.A) Data

This study uses panel data from six leading companies in the metal and mining sector—BHP Group, Rio Tinto, Vale S.A., Freeport-McMoRan, Anglo American, and Glencore—covering the period 2015 to 2025.

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.

Linear Interpolation Formula to go from Annual to Monthly:

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

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)
```

The original data for "Stock_P" were extracted from the library "yfinance" with python, monthly.

All financial variables were deflated and adjusted for currency differences. Missing monthly observations were interpolated linearly to preserve temporal continuity. There wasn't extreme observation, so we didn't have to remove them.

**III.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.

**III.C) Model Specification**

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

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

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

**IV.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, while the average ROA suggests overall positive profitability throughout the observation period.

| 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 |

*Table 1 Descriptive statistics of the variables*

These values confirm that the sample consists of large, profitable companies with limited gender diversity.

## IV.B) Regression Results

### IV.B.1) Global Model results
The following econometric model was estimated:

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

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

### IV.B.2) Variables Analysis

The regression results are summarized below:

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

*Table 2Regression results (dependent variable: Stock_P)*

The coefficient of Gender_D is positive and shows that gender diversity has a positive impact on stock price performance.
Statistics associated with Gender_D are really significant (t = 15.06; p < 0.001). These indicates a strong positive relationship between the share of women in a company in our

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sample and firm performance. The extremely low p-value implies that the probability of obtaining such a result by chance is close to zero. So we can confidently conclude that gender diversity have a positive and statistically significant effect on firm performance in the mining sector.

Both Ln_Tassets and ROA also show positive and coefficients, suggesting that larger and more profitable firms are rewarded by investors through higher stock prices. Also, P-Value of diversity, ROA and Ln(T_Assets) are smaller than 0.05 which means that each of them has a significant impact on the stock price.

It is important to note that out intercept doesn't have an economic interpretation. Even if all the variables of our model equal to zero, it is impossible for a company to have negative valorisation. So the intercept is only the point on the ordinate at absiss zero

**IV.C) 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

The regression results suggest that performance in the mining sector is not solely determined by traditional financial factors such as size and profitability, but also by social and structural aspects like gender diversity.
We do not then reject our hypothesis H1 that says that an increase in the percentage of women in the workforce of mining companies has a positive and significant impact on their market valuation.
The magnitude and significance of the results indicate that social inclusiveness may play a central role in shaping firm outcomes. This supports modern corporate governance theories highlighting the importance of diversity.
In practical terms, this means that mining companies aiming to improve their financial and operational performance might benefit from policies promoting gender equality and inclusion.

Overall, the regression model is both statistically robust and economically meaningful. The high R² value confirms that the selected variables capture most of the variation in the dependent variable. Each coefficient shows the expected sign and remains statistically significant, confirming that the relationships are not spurious. The model therefore provides convincing empirical support for the hypothesis that gender diversity, firm size, and profitability are positively related to firm performance in the mining industry.

In conclusion, the findings of this analysis highlight the importance of integrating both economic and social dimensions in corporate performance evaluation.
Diversity emerges as the most influential factor, even surpassing traditional determinants such as profitability and size. This result encourages managers and policymakers in the mining sector to reconsider the role of gender representation as a driver of long-term growth and competitiveness.
Furthermore, it contributes to the broader discussion in corporate finance and organizational studies regarding the tangible benefits of inclusive management practices. Future research could expand this analysis by incorporating a larger sample of firms or by testing for potential interaction effects between diversity and financial variables to explore whether the benefits of diversity depend on firm size or profitability levels.

## TABLES

| Variable | Description | Observations | Mean | STDEV |
|---|---|---|---|---|
| Stock_P | Monthly adjusted stock | 726 | 383,5786611 $ | 756,46 |
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*Table 3 Descriptive statistics of the variables*

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

*Table 4Regression results (dependent variable: Stock_P)*

| SUMMARY OUTPUT | agregat valo simple | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| *Regression Statistics* | | | | | | | | |
| Multiple R | 0,912944049 | | | | | | | |
| R Square | 0,833466836 | | | | | | | |
| Adjusted R Square | 0,829159944 | | | | | | | |
| Standard Error | 390,1371211 | | | | | | | |
| Observations | 120 | | | | | | | |
| | | | | | | | | |
| ANOVA | | | | | | | | |
| | *df* | *SS* | *MS* | *F* | *Significance F* | | | |
| Regression | 3 | 88364969,27 | 29454989,76 | 193,5193186 | 5,56136E-45 | | | |
| Residual | 116 | 17656008,9 | 152206,9733 | | | | | |
| Total | 119 | 106020978,2 | | | | | | |
| | | | | | | | | |
| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95,0%* | *Upper 95,0%* |
| Intercept | -6814,6099 | 1700,466178 | -4,00749511 | 0,000108812 | -10182,59743 | -3446,62237 | -10182,59743 | -3446,622372 |
| Diversity | 40,75448511 | 2,705886378 | 15,06141774 | 4,56447E-29 | 35,39513619 | 46,11383403 | 35,39513619 | 46,11383403 |
| ln(T_Assets) | 60,51969125 | 22,82469129 | 2,651500977 | 0,00913403 | 15,31251419 | 105,7268683 | 15,31251419 | 105,7268683 |
| ROA | 7,164461559 | 1,518861959 | 4,716993218 | 6,72933E-06 | 4,156164069 | 10,17275905 | 4,156164069 | 10,17275905 |

*table 3 Analysis Toolpack's regression*

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