The Impact of Female Leadership on Operational and Infrastructure Barriers in Firms Around the Globe

Romy Tarantino

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Abstract

This paper examines whether firms led by women are more likely to report operational and infrastructural barriers compared to those led by men. Using cross sectional data of firms across 21 countries, the analysis controls for firm objectives, location, leader age, staffing composition, profit status, legal form, sector, and size. The results reveal that female-led firms are 6-8% more likely to report infrastructure and operational barriers (depending on the model), suggesting that gendered challenges are perceived to exist in female-led organizations' business operations more than male-led organizations. This research shows how important it is to address structural inequalities in order to support female leaders and potentially reduce operational barriers that might inhibit a firm's performance.

I. Introduction

Over the past few decades, the conversation surrounding gender equality and equity has grown exponentially. Research is showing that having a female leader may be linked to positive outcomes such as increased and improved firm performance, enhanced innovation, and inclusive organizational culture (Dezsö and Ross; Kong et al.). With findings like these, it is becoming crucial to leaders, in every industry, how important it is to have diverse representation in leadership. However, despite these benefits, women remain underrepresented at the top levels of business leadership (Wiggins), and the firms they lead may continue to face disproportionately high structural and operational barriers. While much of the existing research highlights the potential advantages of female leadership (Qian; Fang et al.), fewer studies seem to examine whether women-led firms experience unique challenges in day-to-day operations—particularly when it comes to infrastructure, logistics, and access to necessary business resources.

This paper investigates whether the presence of a female leader is associated with an increased likelihood of facing operational and infrastructural challenges at the firm level. Drawing on cross-sectional firm-level data from a diverse set of countries, this study explores whether gender in leadership positions influences the kinds of barriers companies report, controlling for factors such as firm size, sector, geographic location, and workforce composition. The key variable of interest is the gender of the top decision-maker, examined in relation to reported challenges such as supply chain disruptions, access to facilities, and difficulties with infrastructure. In the end, the paper finds that female-led firms are statistically more likely to report infrastructure and operational barriers in business. In this research, operational and infrastructure barriers refers to the firm-level challenges related to production capacity, time

pressure, availability and or cost of suitable premises, expensive transportation and logistics in distributing the firm's product, access to public services and instability in day to day operations.

This paper is driven to continue examining the growing awareness that female leadership does not exist in a vacuum. Women leading organizations often do so within structural environments shaped by social norms, gendered labor markets, and uneven access to resources (Jayachandran; Loscocco and Robinson). To truly understand the relationship between gender dynamics in leadership positions and operational outcomes requires more than just performance metrics—it demands attention to the systems in which these leaders operate. By focusing on operational and infrastructural challenges, this paper provides a different perspective to assess gender dynamics in the workplace globally, and hopes to expand the conversation beyond performance toward the practical realities of running a firm in unequal institutional contexts.

Overall, this study intends to build on the existing literature on gender and economic development by determining if gender-based disparities in leadership extend into the realm of firm-level challenges. If female-led firms are more likely to face these barriers, the findings may have significant implications for policy and practice. It can help magnify the need for more tailored targeted support mechanisms and policies that will allow women to lead without disproportionate constraint.

II. Literature Review

The relationship between female leadership and having operational and infrastructure barriers intersects between gender studies, organizational behavior, and development economics.

This paper aims to discover if firms led by women experience higher rates of operational and infrastructural barriers (as opposed to male-led firms), like access to the necessary resources, logistical inefficiencies, or system-level constraints. The existing literature introduces a multifaceted view: while female leadership may be associated with improved firm performance and innovation, it also exists within a system that was not built to support female leaders and may limit their abilities to overcome these institutional and structural challenges (Jayachandran; Loscocco and Robinson).

Structural Barriers Faced by Female Leaders

Research has consistently highlighted the structural disadvantages women face in leadership and business. Loscocco and Robinson (1991) highlight how experiences women have in small business environments are formed by existing gendered constraints, like limited access to capital, exclusion from influential business networks, and discriminatory lending practices. These constraints can often result in less growth-oriented business strategies and restricted firm scale. Women who are able to surpass these barriers often still lack the proper institutional backing they need, which diminishes their ability to operate efficiently within larger economic structures compared to their male counterparts. These challenges do not stem from leadership competency, but from systemic limitations that may hinder operational fluidity.

Building on this foundation, Wiggins (2010) identifies both explicit and implicit barriers that restrict women from moving up in their organization's hierarchies. Wiggins analyzes women's career trajectories, showing how persistent barriers like glass ceilings, inadequate mentorship, and systemic stereotypes all contribute to workplace disparities. Workplace culture may follow women into their leadership roles, where they may not be able to navigate the

operational complexity because of a lack of informal power or internal support. Without the same influence or support that their male counterparts have, women in leadership roles may find themselves managing firms in environments that subtly resist their authority, therefore complicating infrastructural adaptability.

Similarly, research dedicated to examining the impact of ingrained societal norms on female leadership in developing economies finds that they shape organizational expectations, employment patterns, and resource distribution, reinforcing skepticism others have towards female leaders (Jayachandran, 2020). When women are unable to assert their authority in male dominated settings, they can become alienated from critical operational networks, like supply chains and regulatory bodies.

The Organization for Economic Cooperation and Development (OECD, 2012), provides a broader global perspective. They report that systemic disadvantages disproportionately affect female entrepreneurs and business leaders. In their studies, they find that women are often more likely to operate in lower-growth industries, have more difficulty in securing credit, and experience procedural inefficiencies that delay firm growth and expansion. These issues reflect institutional deficiencies that create more barriers for female-led businesses. Therefore, firms led by women may report higher rates of operational and infrastructural struggles due to systemic constraints.

Female Leadership as a Driver of Innovation and Performance

Even with the existence of these obstacles, research indicates that female leadership can be an important driver of firm success. Duflo 2012 finds that women's empowerment and economic growth reinforce each other. This study shows that female leaders are exceptional in

resource allocation, inclusive decision-making, and employee-centered strategies. These leadership traits are important as they can help promote ethical business practices, and simultaneously encourage resilience and adaptability. This in turn better prepares firms to navigate the logistical and infrastructural hurdles they will face, as long as their female leaders have sufficient autonomy and institutional support.

Furthermore, arguments expanding on this idea say that women's participation in the economy contributes to more sustainable and equitable growth (Lemmon & Vogelstein, 2016). Even with this finding, Lemmon and Vogelstein note that female leaders are still constrained by systemic barriers, especially in environments where they do not have access to capital, infrastructure, and skilled labor. Female leadership has major potential to boost economic outcomes and individual firm performance, but its impact is significantly shaped by the broader institutional framework in which it operates.

Empirical studies further affirm that there are benefits to having female leaders in a firm. Dezsö and Ross (2012), analyze firm performance data, finding that companies led by women often outperform their counterparts. This is particularly true in industries that prioritize innovation and communication. Their work emphasizes that female leaders are most effective in environments where diverse viewpoints are valued. Additionally, women in leadership positions can be especially effective in environments where decision making structures integrate inclusivity. In environments with the opposite approach to highlighting diverse perspectives, these leadership advantages diminish. Therefore, the importance of organizational culture is reinforced in determining a firm's success.

Kong et al. (2024) investigates the strategic contributions of female leaders in fostering corporate innovation. Their findings show that women-led firms are skilled in collaborative management, employee development, and long-term planning. This all strengthens the internal operations of a firm and reinforces its ability to address logistical challenges. Similar to other research, Kong et al. notes that women in leadership positions more often operate under heightened scrutiny and receive less institutional backing. This potentially limits their ability to fully implement innovative strategies. This dual reality suggests that while women may lead effectively, they do so within constraints that male leaders may not experience to the same extent.

Leadership Within Constraint

Overall, the existing literature suggests that the presence of female leadership does not inherently cause operational or infrastructural challenges. Rather, women tend to lead within environments that are structurally unequal and do not provide proper support. The literature finds that female leaders make valuable contributions to firm performance and innovation, yet they do so within contexts that may increase the likelihood of encountering barriers. So, in examining this relationship, any observed correlation between female leadership and firm-level barriers must be interpreted keeping these systemic factors in mind.

This research paper builds on that foundation by empirically investigating whether female-led firms report more operational and infrastructural challenges, using cross-sectional data across multiple countries. By controlling for firm characteristics, industry type, leadership demographics, and country, this study intends to isolate whether gender in leadership is independently associated with increased barriers—or if these associations are better explained by

the structural disadvantages that female leaders disproportionately face. Through this analysis, the research aims to offer a more refined perspective on the conditions shaping female leadership and its operational implications.

III. Data Description

This research utilizes firm-level cross-sectional data to examine the relationship between the presence of female leadership in companies and the likelihood of facing operational and infrastructural challenges. The dataset includes firms who were established in various years, including ones as early as 1638, and range from non-profits to social enterprises to for profit firms, covering 21 countries and yielding a total of 3,594 firm-level observations.

The primary data source is the British Council's Social Enterprise dataset, which surveyed firms about their operational barriers, leadership characteristics, organizational attributes, primary purpose as an organization, and logistical measures. To measure female leadership, the dataset includes the gender of the top decision-maker for each firm. The dependent variable, barriers, was derived from the greater categorical variable "Barriers", and grouped into 4 subcategories. Within the four subcategories (financial barriers, human capital and organizational development barriers, operational and infrastructural barriers, and other barriers), operational and infrastructural barriers had the greatest influence on the variable FemaleLeader. Specifically, the operational and infrastructural barriers category refers to firm responses like "Access to public services (transport, energy, water, and sanitation)," "Access to

premises," and "Transport/distribution/logistics." These responses and more were grouped from the survey's original 35 barrier types into broader categories.

The control variables included in the analysis are: Objectives, Location, Leader Age, Percentage of Full-Time Female Staff, Percentage of Part-Time Female Staff, Social Enterprise Status, Profit Status, Legal Form, Sector, and Employment Banding for both full-time and part-time staff.

Each of these controls plays an important role in isolating the relationship between female leadership and operational barriers. For example, the Objectives variable captures the mission and priorities of each firm, which may influence the types of challenges it faces. Location helps control for any geographic constraints—such as transportation costs or limited infrastructure—that could disproportionately affect firms in remote or underdeveloped areas.

Leader Age is included to account for variation in experience and social capital, which may influence a firm's ability to navigate challenges. The Percentage of Full-Time and Part-Time Female Staff provides insight into the firm's gender composition, helping to assess whether broader gender dynamics within the firm influence its exposure to barriers.

Social Enterprise Status identifies whether a firm defines itself as a social enterprise, which may shape both its goals and the types of challenges it encounters. Including Profit Status allows us to assess whether profitability is associated with a reduction in reported barriers and whether this differs across gendered leadership. Legal Form distinguishes between different types of organizational structures (e.g., sole proprietorships, cooperatives, limited liability companies), which may entail different levels of regulatory burden or institutional support. The category 'Charitable organisation' includes society, not for profit, Ltd by guarantee, Trust,

Cooperatives, association, NGO, Foundation. These may be somewhat broad, but some countries categorised this broadly originally so it's not possible to break them down further.

Finally, Sector is a critical control variable, as the nature of operational and infrastructure challenges may vary significantly across industries. For instance, firms in agriculture may face distribution-related barriers, while those in hospitality may encounter staffing or supply chain constraints. The Full-Time and Part-Time Employment Banding variables control for firm size, which is a known determinant of access to resources and overall resilience and may be related to female leadership.

The British Council's sampling methodology involved identifying firms that self-identified as social enterprises, were engaged in socially beneficial work, or did not have a mission driven purpose at all.

While the dataset provides firm-level details and covers a diverse range of organizations across 21 countries, its representativeness at the global level might be limited. The British Council collected the data in this dataset, with a specific focus on social enterprises and their environments. This means that this sample may be overrepresented by mission driven firms as opposed to the broader standard private sector firms. With this in mind, the findings in this research will be interpreted with this context in mind and may not generalize to all firms in a country.

Together, these variables enable a more nuanced analysis of how female leadership intersects with firm characteristics to influence the likelihood of encountering operational and infrastructural barriers.

Table 1A: Variable Descriptions

barriers	OPR/INF Barriers
FemaleLeader	Leader is Female
objective_1	Economic & Employment
objective_2	Education & Community
objective_3	Health & Basic Needs
objective_4	Inclusion & Human Rights
objective_5	Sustainability & Environment
Location_1	International Firm
Location_2	National Firm
Location_3	Other Firm
Location_4	Regional Firm
leaderagebanding_1	Leader age 16-24
leaderagebanding_2	Leader age 25-44
leaderagebanding_3	Leader age 45-64
leaderagebanding_4	Leader age 65+
FemaleofFTstaff	Female % of Full Time Staff
FemaleofPTstaff	Female % of Part Time Staff
SocialEnterprise	Described as a Social Enterprise
Profitable	=1 if Makes a Profit, 0 Otherwise
legalform_1	Charitable Organization

Table 1B: Variable Descriptions Continued

legalform_2	Other
legalform_3	Private Company
legalform_4	Sole Trader
sector_1	Agriculture & Natural Resources
sector_2	Arts & Creative Industries
sector_3	Business & Economic Development
sector_4	Digital & Technology
sector_5	Education & Skill Development
sector_6	Energy & Environment
sector_7	Food & Hospitality
sector_8	Health & Social Services
sector_9	Other
FTbanding_1	0 Full Time Banding
FTbanding_2	1-9 Full Time Banding
FTbanding_3	10-49 Full Time Banding
FTbanding_4	250+ Full Time Banding
FTbanding_5	50-249 Full Time Banding
PTbanding_1	0 Part Time Banding
PTbanding_2	1-9 Part Time Banding
PTbanding_3	10-49 Part Time Banding
PTbanding_4	250+ Part Time Banding
PTbanding_5	50-249 Part Time Banding

TABLE 2: SUMMARY STATISTICS

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	Mean	SD
OPR/INF Barriers	0.20	(0.40)
Leader is Female	0.40	(0.49)
Economic & Employment OBJ	0.40	(0.49)
Education & Community OBJ	0.08	(0.28)
Health & Basic Needs OBJ	0.08	(0.27)
Inclusion & Human Rights OBJ	0.10	(0.30)
Sustainability & Environment OBJ	0.34	(0.47)
International Firm	0.14	(0.34)
National Firm	0.28	(0.45)
Other Firm	0.01	(0.10)
Regional Firm	0.57	(0.50)
Leader age 16-24	0.08	(0.28)
Leader age 25-44	0.56	(0.50)
Leader age 45-64	0.31	(0.46)
Leader age 65+	0.05	(0.21)
Female % of FT staff	0.51	(0.33)
Female % of PT staff	0.56	(0.36)
Described as Social Enterprise	0.72	(0.45)
Makes a Profit	0.49	(0.50)
Charitable Organization LF	0.38	(0.49)
Other LF	0.15	(0.36)
Private Company LF	0.32	(0.47)
Sole Trader LF	0.14	(0.35)
Agriculture & Nat. Resources SEC	0.18	(0.38)
Arts & Creative Industries SEC	0.08	(0.27)
Business & Economic Dev. SEC	0.21	(0.41)
Digital & Technology SEC	0.06	(0.24)
Education & Skill Development SEC	0.15	(0.36)
Energy & Environment SEC	0.06	(0.24)

Food & Hospitality SEC	0.06	(0.24)
Health & Social Services SEC	0.08	(0.27)
Other SEC	0.10	(0.31)
0 FTB	0.20	(0.40)
1-9 FTB	0.52	(0.50)
10-49 FTB	0.20	(0.40)
250+ FTB	0.02	(0.15)
50-249 FTB	0.06	(0.23)
0 PTB	0.38	(0.49)
1-9 PTB	0.44	(0.50)
10-49 PTB	0.14	(0.35)
250+ PTB	0.01	(0.10)
50-249 PTB	0.03	(0.17)
Observations	3594	

NOTE: Table reports averages with standard deviations in parentheses.

IV. Empirical Model

To assess whether the presence of female leadership is associated with an increased likelihood of experiencing operational and infrastructural challenges, I estimate a linear probability model using cross-sectional data at the firm level:

$$barriers_i = \beta_0 + \beta_1 FemaleLeader_i + \boldsymbol{X}_i + u_i$$

In this case, the dependent variable, barriers, is equal to 1 when a firm reports facing operational and infrastructure-related challenges and 0 otherwise. The key independent variable, FemaleLeader, is a binary indicator equal to 1 if the firm's top leader is female and 0 otherwise.

The term $\boldsymbol{X}_{it}$ represents the firm-level control variables that help isolate the effect of female leadership. These include:

- Objectives: the strategic goals set by the firm

- Location: represents geographic constraints and infrastructural access
- Leader Age: as a measure of experience and leadership maturity
- Percentage of Full-Time Female Staff and Percentage of Part-Time Female Staff: to capture gender composition across staffing levels
- Social Enterprise Status: whether the firm identifies as a social enterprise
- Profit Status: whether the firm reports making a profit
- Legal Form: the firm's structural classification (e.g., sole proprietorship, LLC)
- Sector: industry classification
- Full-Time and Part-Time Banding: for firm size and employment structure

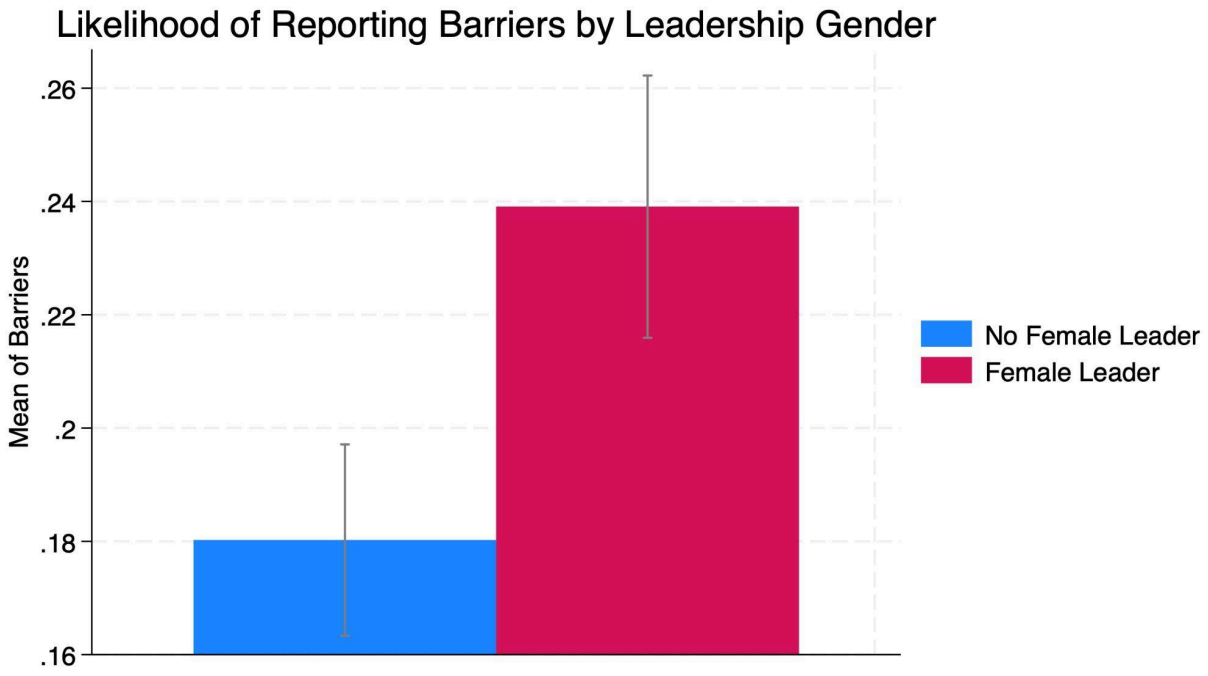
I control for country in case certain countries have both more barriers and more or less female leaders.

The coefficient of interest, β_1, captures the estimated difference in reported barriers between firms led by women and those led by men, holding all other factors constant. Based on existing literature and preliminary findings, I expect $\beta_1>0$, suggesting that female-led firms are more likely to report operational and infrastructure barriers, possibly due to gendered access to resources, support networks, and systemic bias.

Figure 1 below presents a bar graph with 95% confidence intervals showing the mean level of reported barriers among firms with and without female leadership. The figure demonstrates that, on average, firms led by women report a higher incidence of operational and infrastructure challenges compared to those led by men, supporting the hypothesis that female leaders are more likely to report barriers.

One limitation to keep note of is the potential endogeneity of the FemaleLeader variable. It is possible that unobserved characteristics like firm culture, leadership selection process or external pressure could affect if a woman is selected to be a leader and the types of barriers that are then reported. This paper includes a robust set of control variables to account for this and isolate the relationship, but, future research could benefit from exploring instrumental variable approaches or use panel data to address potential endogeneity.

Figure 1: GRAPH



V. Regression Results

Table 3A:

Operational and Infrastructure Barriers and Having a Female Leader

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Leader is Female	0.0589*	0.0909**	0.0786**	0.0661**	0.0630**
	(0.0318)	(0.0359)	(0.0342)	(0.0244)	(0.0235)
Constant	0.180***	0.162***	0.161***	0.269***	0.231***
	(0.0262)	(0.0270)	(0.0500)	(0.0462)	(0.0565)
Observations	3,297	1,252	1,239	1,239	1,228
Adjusted R-squared	0.005	0.011	0.015	0.131	0.128
Restricted Sample	NO	YES	YES	YES	YES
Controls	NONE	NONE	Obj., Sect.	Plus Country	Plus Soc.Ent.
F-Test on:			Obj., Sect.	Country	Soc.Ent.
p-value			0.0123	0.000	0.049

Robust standard errors are clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table 3B:

Operational and Infrastructure Barriers and Having a Female Leader

	(1)	(2)	(3)
VARIABLES	Model 6	Model 7	Model 8
Leader is Female	0.0777**	0.0563**	0.0729**
	(0.0273)	(0.0256)	(0.0280)
Constant	0.248**	0.195**	0.258**
	(0.0853)	(0.0784)	(0.110)
Observations	1,228	1,064	1,064
Adjusted R-squared	0.122	0.132	0.128
Restricted Sample	YES	YES	YES
Controls	SET A	SET B	ALL
F-Test on:	New Controls	New Controls	
p-value	0.1557	0.4629	

Robust standard errors are clustered at the country level.

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Control Variables in Regression Results Table

SET A	• Objectivenum • Sectornum • Countrynum • SocialEnterprise • Locationnum • Leaderagenum • FemaleofFTstaff • FemaleofPTstaff • FTbandingnum • PTbandingnum
SET B	• Objectivenum • Sectornum • Countrynum • SocialEnterprise • Profit_num • Legalformnum
ALL	• Objectivenum • Countrynum • Locationnum • Leaderagenum • FTbandingnum • PTbandingnum • Legalformnum • Sectornum • FemaleofFTstaff • FemaleofPTstaff • SocialEnterprise • Profit_num

All in all, my regressions present that female-led firms are more likely to report having infrastructure and operational barriers. Table 3A displays the results of the first 5 models tested, and Table 3B presents the last 3 models tested. The models gradually incorporate the various

controls into the model to thoroughly analyze the relationship between having a female leader and the level of operational and infrastructural barriers faced by these firms.

Within Table 3A are the first 5 models tested. It is seen in the first simple linear probability model (Model 1) that the main independent variable FemaleLeader has a coefficient of 0.059. This signifies that female leaders are 5.9% more likely to report barriers in operations and infrastructure, without controlling for any other variables. This indicates the presence of a positive relationship that was hypothesized earlier. The relationship is statistically significant at the 10% level, showing that the relationship between the main independent and dependent variable is significant and related and should continue to be explored.

Before testing the relationship with all of the control variables, I found it important to restrict the sample that the regressions were involving. The reason for this is due to certain control variables having more missing values than others, therefore skewing the results produced. By restricting the sample to ensure that the relationship is not being heavily affected by missing values, Model 2 identifies a more accurate view of the relationship between the independent and dependent variables that will be comparable to the subsequent models. As shown in Table 3A, Model 2, the baseline relationship between FemaleLeader and barriers_3 is tested again, this time restricting the sample. In this model, the coefficient of FemaleLeader increased to 0.091 - signifying that this relationship may have been suffering from omitted variable bias by not restricting the sample. The p-value of the relationship decreased to 0.023. The significant p-value on the restricted baseline model shows how the relationship became stronger when restricting the sample.

Model 3 in Table 3A controls for the variables Objectives and Sector. This relationship had a coefficient of 0.079 and was significant at the 5% level. This relationship was once again restricted as it was in the previous model. After running a joint F-Test, the controls demonstrate that they are jointly significant, indicating that a firm's objective and the sector in which they operate explains some of the variation in operational challenges for both genders. Once these controls were added in, the coefficient for FemaleLeader remained similar compared to the restricted baseline relationship in Model 2. Indicating that omitting sector and objective was not causing any concerning omitted variable bias.

Model 4 kept the control variables Objectives and Sector, but additionally controlled for country. It was important to add in the control for the country to account for any unobserved country-specific factors. The country dummy variables were highly jointly significant (having a p-value of 0.000), with many of the country specific dummy variables also being independently significant. Even with this significance, the coefficient for FemaleLeader changed by a very small margin of 0.013 to 0.066. This model overall was also statistically significant at the 5% level. As the main coefficient and statistical significance of the model remained stable and similar in both Model 3 to Model 4, we can determine that the result is not simply driven by cross-country differences.

Model 5 builds on Model 4 by adding the variable SocialEnterprise (whether the firm is described as a social enterprise) in with the control variables Objectives, Sector, and Country. The variable is marginally significant (with a p-value of 0.049) and the coefficient for FemaleLeader is 0.063 (only changing by 0.003) and remains significant at the 5% level.

Including the control variable SocialEnterprise doesn't change the relationship between FemaleLeader and barriers very much.

Model 6 still includes the controls Objectives, Sector, Country and SocialEnterprise, and further builds on the previous model to include organizational characteristics of a firm. The new controls added to this model are firm location, leader age banding, the percentage of female full time and part time staff, and the bandings of full time and part time employees in a firm. The FemaleLeader coefficient remained relatively stable at 0.078 and statistically significant at the 5% level. The new control variables were independently insignificant, and after running a joint F-Test, they proved to be jointly insignificant as well (with a p-value of 0.1557). This indicates that these controls do not meaningfully explain any variation in operational barriers across firms. Due to this, the control variables firm location, leader age banding, the percentage of female full time and part time staff, and the bandings of full time and part time employees in a firm can be removed from the subsequent models.

Model 7 adds measures of firm profitability and legal form on top of the control variables Objectives, Sector, Country and SocialEnterprise. These control variables were both independently and jointly insignificant (with a p-value of 0.4629), suggesting that they do not meaningfully explain the variation in operational barriers among firms. The coefficient for FemaleLeader was 0.056 and remained significant at the 5% level.

Finally, Model 8 involves all 12 control variables to determine if the effect of having a female leader on perceptions of operational barriers changes with the inclusion of all previously tested control variables. The coefficient for FemaleLeader in this model is 0.073, having remained stable from model to model. This model is statistically significant at the 5% level, and

female-led firms seem to report statistically more operational barriers than male-led firms even after controlling for objectives, sector, country, social enterprise status, location, leader age, staffing composition, profit status, legal form, and firm size. This consistency between models suggests that the effect of having a female-led firm and having operational and infrastructure barriers is not heavily influenced by omitting these variables or firm characteristics.

Additionally, all of the models clustered their standard errors at the country level because firm-level observations within each country may not be independent. The underlying assumption in a cross-sectional regression analysis dataset is that observations are independent of one another. Of course firms in a particular country may not be independent of other firms in the same country, and clustering the standard errors at the country level accounts for this.

In the end, the models show that having a female leader in a firm is associated with reporting higher operational and infrastructural barriers, even after controlling for firm objectives, sector, country, social enterprise status, location, leader age, staffing composition, profit status, legal form, and firm size.

VI. Summary and Conclusion

All in all, after controlling for a variety of variables and factors that could be related to both the presence of female-led firms and perceived barriers, the coefficient for FemaleLeader remained consistently positive and statistically significant (at the 5% level most often). This signifies that firms that are led by women report experiencing a greater level of operational and infrastructural barriers than male-led firms, and this relationship remained robust across many different models. This result remained consistent throughout all eight models tested, even as

controls such as objectives, sector, country, location, social enterprise status, leader age, staffing composition, profit status, legal form and firm size were added in. Overall, this shows strong evidence that female-led firms are more likely to report operational barriers, even after controlling for a variety of firm characteristics and even the country in which the firm operates.

My final model (Model 8) includes all of the control variables, with the coefficient for FemaleLeader remaining positive and significant. This demonstrates how stable and strong the relationship between the female-led firms and reporting the presence of barriers to operations and infrastructure. The model explains approximately 2.6% of the variation in operational and infrastructure barriers reported. Even though this adjusted R-squared is relatively low, it isn't completely uncommon, as firm-level survey data can often be missing many observed factors that may also affect operational barriers. In the control variables, Objectives, Sector, Country, and SocialEnterprise appeared to be important in explaining some of the variation in the model. This suggests that a firm's objectives, what sector they are operating in, what country they are in, and their social enterprise status play some role in shaping the presence of operational and infrastructural barriers.

The linear probability model observed between having a female leader and having operational and infrastructure barriers is in line with my initial hypothesis of a positive linear probability model and statistically significant relationship between the variables. One possible explanation is that female-led firms face more challenges based on the type of structural and institutional barriers they face. This relates back to the existing research on female leadership in firms who may face more specific and unique challenges that are not often tested.

Even though the regressions do not confirm causality, it does suggest that there is a significant pattern in disadvantages that women face in top level leadership positions of their firms. This pattern pushes for policies to level the playing field for female-led firms. In general, calling attention to this pattern could help female-led firms gather more support, helping them address the biases that they may face in their industries.

In conclusion, the effect of positive and statistically significant relationship between having a female-led firm and having operational and infrastructural barriers stays consistent across all 8 models tested, even after controlling for a variety of variables that could potentially explain the relationship. This draws attention to the deeper issue at hand and the necessity of discovering the systemic and institutional issues that female leaders and their firms face. Once acknowledged, this could lead to solutions in order to address the issue going forward.

VII. Limitations and Future Research

Despite its potential contributions, this research does have many limitations to acknowledge. One of the biggest limitations to this research is that the main dependent variable, barriers, is based on perceptions of operational and infrastructure barriers in business. This is mainly due to the nature of the entire survey that the data set is based on - where there are no real measures to the barriers that a firm faces, only perceptions of barriers. In future research, it could be helpful and potentially provide a more accurate view of this relationship if actual measures of barriers were included. If this measure was available in a dataset, it would be interesting to

compare how the relationship changes using actual barriers measure versus perceptions of barriers.

An additional limitation in this study is that it is not clear who is providing the responses for each question in the survey. Since the dataset covers a variety of different factors that comprise a firm's characteristics and may affect a firm's performance, it is not specified if female leaders were even the respondents in the survey representing their companies. As the British Council's dataset does not specify who filled out the survey, it is possible that the responses for some or many of the questions may not reflect the opinions of the firm's leadership. For instance, if male individuals in female led organizations are filling out the survey and report having operational and infrastructural barriers, there is no way for us to know if the female leader would respond in this manner. I reviewed the British Council's methodology section and could not find any answer to this question, so it is being treated as a limitation in this research.

Another limitation of this research has to do with the data constraints present. There was a limited set of variables in the data, with the majority of them being categorical variables. Even though I could not add in variables from other datasets, the British Council's data did prove to be strong enough to discover interesting and significant relationships. To better observe how barriers change over time (perhaps covering a period of 3-5 years) and improve this research, other datasets, (from the World Bank or World Values Survey) could be linked and combined with the British Council's data. The data used in this research was cross-sectional and provided a view of the main relationship in one time period. It could be interesting and useful to measure how the relationship between having female leaders in a firm and having infrastructural and

operational barriers shifts over the years, and especially in certain years like before and after the COVID-19 pandemic.

In addition, the barriers that individual firms reported having were somewhat ambiguous in nature, potentially limiting the accuracy of the overall analysis. In the original survey, respondents were asked "What are the major barriers your organization faces?" and in the end, 35 types of responses were generated. These responses ranged from "Access to public services (transport, energy, water, and sanitation)" to "Obtaining funding and finance" to "Time pressure". Responses had to be grouped into broader categories in order to create a cleaner dummy variable to test in a regression analysis. Future research could benefit from having a more organized set of options that respondents could answer the survey with, in order to ensure accurate analysis.

Another important limitation is the potential for reverse causality. It is possible that firms that already face higher operational and infrastructure barriers are more likely to put women in leadership positions. Firms that are struggling may diversify their leadership or hire candidates from a new talent pool. As this analysis is based on correlations, it is difficult to pinpoint the exact direction of the relationship.

In general, this research provides evidence that female led firms report having a higher level of barriers to infrastructure and operations. While this relationship remained positive and statistically significant, future research could benefit from approaching this relationship from different angles and using a different set of controls to better observe the patterns that emerge.

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