Leading the fight against the pandemic: does gender 'really' matter?

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Leading the Fight Against the Pandemic: Does Gender 'Really' Matter?

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Abstract

Since the start of the ongoing coronavirus pandemic, the relationship between national female leaders and their effectiveness in handling the COVID-crisis has received a lot of media attention. In this paper we scrutinise this association more systematically. We ask if there is a significant and systematic difference by gender of the national leader in the number of COVID-cases and deaths in the first quarter of the pandemic. We also examine differences in policy responses by male vs. female leaders as plausible explanations for the differences in outcomes. Using a constructed dataset for 194 countries, a variety of socio-demographic variables are used to match nearest neighbours. Our findings show that COVID-outcomes (especially deaths) are systematically better in countries led by women and, to some extent, this may be explained by the proactive and coordinated emergency policy responses adopted by them. We use insights from behavioural studies and leadership literature to speculate on the sources of these differences, as well as on their implications. Our hope is that this article will serve as a starting point to illuminate the discussion on the influence of national leaders in explaining the differences in country COVID-outcomes.

Key words: COVID-19*, Pandemic, National Leadership, Women Leaders, Risk Aversion.*

I. Introduction

National responses to the COVID-19 pandemic and their outcomes have been avidly compared across the world. Given the importance of leadership in times of crisis, national leaders have been in the spotlight. Have leaders been slow in recognising the risks? Have they engaged with the science? Have they weighted the economic costs more heavily than lives? In this context, much has been written about the performance of women leaders in the media especially of two high-profile female leaders (Angela Merkel and Jacinda Ardern) who seemed to have steered their countries through the initial weeks with less loss of life than their immediate comparators in Europe.

In this paper, we consider the question of the leader's gender and COVID-outcomes more systematically and discuss some of the plausible reasons for our findings. Using a 194-country dataset constructed for this purpose, we analyse two questions. First, are there any significant and systematic differences in the COVID-outcomes (cases and deaths) of male and female-led countries in the first quarter of the pandemic? Second, can we point to differences in policy measures adopted by these leaders that might explain the differences in outcomes? In particular, we consider the timing of lockdown in these countries.

The paper relates to various branches of literature that examine gender-differences in beliefs and behaviour, in particular the attitudes to risk and uncertainty. There is strong evidence within this literature that women, even those in leadership roles, are more risk-averse than men. For example, Charness and Gneezy (2012) assemble 15 studies that report findings from one investment game, carried out in different countries, with different instructions, durations, payments and subject pools. They find consistently that men invest more, and thus appear to be more risk taking than women. While this headline result is far from canonical (see Nelson, 2015), especially given the role that cultural and contextual modulators play (see Gneezy Leonard and List, 2009; Schubert, 1999), it surfaces very frequently. In the current crisis too, several incidents of risky behaviour by male leaders have been reported including the dismissal of COVID-19 as "a little flu or a bit of a cold" by Bolsanro of Brazil and Britain's Boris Johnson's statement that he"shook hands with everybody" at a hospital that he visited (. While it is tempting to draw simplistic conclusions based on such reportage, a reliable conclusion requires systematic investigation.

Our paper also relates to literature on the role of leaders in national outcomes, which lends texture to two conceptually extreme opinions: the idea that powerful leaders are a social myth, created to satisfy our psychological needs (Gemmill and Oakley, 1992) Vs. the view that, a handful of influential leaders as determining the course of history (Keegan, 2003). The second view has found greater credence in the literature. Jones and Olken (2005), using death of a leader as an exogenous variation in leadership, find that individual leaders play a crucial role in shaping national growth. Besley, Montalvo and Reynal-Querol (2011) find that more competent leaders (in terms of education and skills) result in better national outcomes.

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The performance of leaders in the COVID pandemic offers a unique global experiment in national crisis management where various issues, including that of effectiveness of leadership, can be examined across countries. There are very few studies about the impact of leader's gender in a national crisis, partly at least, because there are so few female leaders. In our sample of 194 countries, we have just 20 (~10%) female leaders. This lack of female-leadership has given way to the 'single-sex' conjectures that support the 'Great Men' view of history, within which events are seen as determined by the instrumental and causal influence of a small number of men. For example, Keegan (2003) writes that the political history of the last century can be found in the biographies of six men: Lenin, Stalin, Hitler, Mao, Roosevelt, and Churchill. However, if a leader's attributes or traits have explanatory power, as much of the literature concludes, then gender might also be important in representing an inherent proclivity for certain types of policy making, especially in the case of an emergency like the pandemic.

This question is of significance to feminist scholarship regarding how a female leader should behave (see Chin, 2004). Much of the dominant discourse within the leadership literature remains heavily masculinised, with female leaders being asked to 'lean-in' or conform to behaviour expected of a "leader" (Sandberg, 2013). These impositions suggest an acceptance of the 'absolute' dominance of traits of leadership that are deemed as successful at all times and in all situations, and which women must imbibe if they seek to succeed. On the other hand, it might be more appropriate to view leadership success as being 'contextual' –certain traits being better suited to tackling certain situations. This points to diversity in leadership, not merely as a way of ensuring or signaling gender equality (which may have its own value) but as a way to promote efficiency in the face of multi-dimensional challenges.

A note of caution before we begin. The pandemic is still in its early stages and our analysis relates only to the initial responses of national leaders and initial outcomes of the pandemic. Given the fast-evolving situation, much will change over the next few months. Despite this, the first quarter reactions and outcomes are revealing because they capture the initial, instinctive and emergency responses of the leaders before institutions take over. They therefore highlight the significance of early and effective leadership in a crisis.

The rest of the paper is arranged as follows. The next section discusses construction of the dataset and methodology. Section 3 presents the results. Section 4 uses insights from risk and leadership literature to speculate on the sources of these differences. Section 5 concludes.

II. Data and Methodology
Data construction

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This paper uses a dataset collated by the authors for the purpose of this enquiry. We gathered information on total deaths and total cases due to COVID-19 up to May 19th from the Worldometer site. We merged this with a range of socio-demographic and economic data from the World Development Indicators and UNDP's Human Development Indicators for 194 countries. We collated data on current female leaders from various websites. If countries have more than one head of state, we made a distinction between the executive head (de facto head) and the titular head (de jure or nominal head) based on the characteristics of the political system. We followed the general rule that: in parliamentary regimes, the prime minister is the executive leader while in presidential systems, it is the president, and in communist states, the chairman of the party is the executive head of state.[2] We use this dataset to analyse first, if there is a systematic difference by gender of the national leader in the total number of deaths and cases experienced due to COVID-19. We also use it to consider national policy responses to the pandemic, particularly the timing of lockdown.

The first step of our analysis centres around two outcome variables – the total number of COVID cases and total deaths. There are several problems with the quality of data available on these two variables in the first quarter. To start with, the number of cases depended on the amount of testing that a country had been able to undertake. With the shortage of test kits, most countries had undertaken less than optimal testing. Over time, as the availability of tests increases, this data should become more reliable. To the extent that tests were reserved for those who were symptomatic, data on deaths is likely to be more reliable though there are concerns about its comparability across countries. In some countries, if a COVID-positive person dies, the death is registered as a COVID-death, irrespective of any other previous illness (like tuberculosis, cancer). But this practice varies across countries. Our analysis is based on the best data available but it is subject to these limitations. As time progresses better COVID data will become available and this analysis can be updated.

Another issue that needs to be highlighted is the fact that this study relates to the start of the pandemic. There is the expectation that the pandemic will last for at least 12-18 months, until we find a vaccine or develop herd immunity (Gallagher, 2020). Our analysis therefore is only about the immediate reaction to the first wave. Outcomes by the end of the pandemic will depend on a range of other factors including the impact of other institutions, the cultural norms prevalent in countries and the impact of the lockdown on the economy, health and well-being of individuals.

Methodology

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[2] It is worth noting that identifying a country as male or female-led was not always straightforward. In Namibia, for instance, the Head of Government is designated as a female but the Head of State and Government is a male. On further reading, we assigned it as a male-led country. Switzerland is led by a Council of Members who share power. Since 1 January 2020, the President (for one year only) is a woman. We therefore designated Switzerland as a female-led country.

As mentioned above, any investigation involving female leaders suffers from the problem of small sample size, with only 20 out of 194 countries being led by women in our data. In addition, countries that select female leaders may have specific characteristics which enable them to respond to such crises better. They may be richer, less populous or have better gender relations. Thus, OLS estimation (see Appendix Table A1) could suffer from two problems – that of a small number of female-led countries and the potential problem of selection. To correct for these problems, we use the nearest neighbour matching method wherein we compare a unit in the treated group (female-led countries) with a unit in the control group that is as similar to it as possible along a range of covariates. Matching is a quasi-experimental technique that provides a more reliable way of comparing two groups when sample sizes are heavily imbalanced and where there may be selection issues (see Stuart, 2010).

The nearest neighbour matching method pairs each female-led country in our sample with its closest comparator and estimates the effect of being female-led on the dependent variables (COVID-19 cases and deaths). The closeness of the match depends on the variables we are matching by. While matching by discrete variables is straightforward, exact matching on continuous variables is less likely, because two countries are unlikely to have exactly the same population or the same elderly population. This problem is compounded when we match by many continuous variables and this makes the matches less "close".

In our analysis, the initial matching is based on four socio-demographic and economic variables that have been seen as important in the transmission of COVID-19 – GDP per capita (current USD), Population, Population density (people/Km2) and Population over 65 Years. We use these variables to match for a range of reasons. First, we include population as we might expect the number of cases and deaths to be higher in countries with larger populations. This variable helps us to control for differences in population size. Second, we include GDP per capita as both the impact of COVID-19 and the ability to respond to it are likely to be influenced by how prosperous a country is . In particular, we might expect that individuals in less densely populated and prosperous countries are likely to be able to socially-distance more easily than those in heavily populated and poorer countries. In the initial estimates, the GDP variable would also capture the impact of health infrastructure but we have controlled for this separately in our extension models. Third, we include population density as a matching variable because it has been observed that COVID-19 spreads faster in densely populated regions where social distancing is difficult. Finally, we include population over 65 because it is clear that COVID-19 is especially fatal amongst older individuals, with the death rates climbing steeply for the over 60s).

We follow this core analysis by testing for robustness across the sample as well as across matching variables. We consider not only the nearest neighbour but also two nearest, three nearest and five nearest neighbours to

consider how robust the effect is. We also extend our matching variables to include three other characteristics – Annual Health Expenditure per capita, Number of Tourists entering the country and Gender Inequality. Each of these variables allows us to control for a factors that could be significant in determining the outcome variables. [3]

We may expect that countries that have a better equipped health system are likely to perform better in the context of a pandemic. We therefore extend our matching model by including the annual expenditure on health in each country (current USD). We also match by openness to tourism because the more open a country is to international travel, the harder it will be to control the initial importation of the pandemic. Third, it has been mooted that countries that have more gender equitable institutions might well be those that elect women leaders and that, their gender equality rather than their women leaders may have facilitated their differentially better outcomes. This may not only mean that women find gaining power easier in these countries, but that women in power may also enjoy greater trust and support from a political and social context that perpetuates the acceptance of female leaders, and may find it easier to champion cautious policies, if they choose to do so. Indeed, the COVID-19 experience of a group of Scandinavian countries may well fall in this category. Matching by the UNDP's Gender Inequality Index (GII) therefore allows us to control for these differences between women-led countries and their comparators and to identify the impact of a country being female-led more precisely. The GII is made up of three distinct components – health (maternal mortality and adolescent birth rate), empowerment (education and number of Parliamentary seats held by women) and women's labour market participation.

III. Results

COVID-cases and deaths by gender of leader

Table 1 presents summary statistics for the matching covariates and dependent variables by gender of the country's leaders. Although these are raw statistics and not useful to draw inferences, it is clear that female-led countries have fared better in terms of absolute number of COVID-cases and deaths, with male-led countries having nearly double the number of deaths (~2000) as female-led ones (~1000).

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[3] We considered several other variables. Noteworthy among these are 'trust' and 'risk aversion' that citizens evince (trusting citizens are more likely to be receptive to emergency policy measures and risk averse individuals more likely to socially distance and wear masks) as well as 'timing of election' (countries on track to run elections may have different policy responses in terms of the timing of lockdown). But data limitations for these variables reduced our sample severely. For instance, for 'trust' we had data for just six female-led countries; for a measure of 'risk aversion' it went down to four and for 'timing of election' it was one as Serbia was the only female-led country that was scheduled to have elections during the period of study. Despite this, results remained robust (especially on deaths) and are available from authors on request.

Table 1: Summary statistics for matching covariates and dependent variables by gender of leaders

Study variable	Female-led countries					Male-led countries				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Dependent variables										
Total COVID-cases	20	16,806	40,231	12	177,289	173	26,333	126,399	8	1.550e+06
Total COVID-deaths	20	1,056	2,619	1	9,080	150	1,994	9,046	1	91,981
First-stage matching covariates										
GDP pc (current USD)	18	38,123	26,222	1,326	82,797	158	14,547	23,246	271.8	185,741
Population	20	2.001e+07	3.991e+07	38,717	1.647e+08	174	4.190e+07	1.555e+08	30,231	1.439e+09
Population density	20	675.2	1,569	3	7,140	174	505.3	2,652	0	26,337
Population 65 years and over	18	15.23	5.096	5.158	21.72	162	8.471	6.162	1.085	27.58
Extended matching covariates										
Avg annual pc health expenditure	13	3,014	2,538	18.75	7,375	159	724.4	1,240	13.59	7,456
Number of international tourists	18	7.151e+06	1.055e+07	178,000	3.888e+07	137	9.196e+06	1.598e+07	14,000	8.932e+07
Gender Inequality Index 2018	13	0.186	0.184	0.0390	0.542	141	0.363	0.186	0.0440	0.834

Source: Dataset constructed by authors from various sources.

- *COVID-outcomes (first step matching)*

As discussed above, we use the nearest neighbour matching method, which matches 18 of the 20 female-led countries in our sample with their nearest neighbour using four matching characteristics - GDP per capita, population, population density and percentage of elderly dependants. As the number of matching characteristics increase, the size of the sample falls as we do not have complete for all countries. In particular, for the smaller female-led countries like Aruba and Sint Maarten, we are unable to provide matches even with a base model which only matches with Population and GDP per capita.

Table 2a presents the results for matched estimations for both total COVID-cases and deaths. Our matched estimations show a definite and consistent pattern, confirming that there are 1900 fewer deaths in women-led countries than in comparable countries led by men. This is also true of the number of cases which are between 18,640 to 22,924 fewer in female-led countries when compared to matched male-led ones, although here the significance of the treatment variable decreases as we increase the number of matches. These results suggest that controlling for GDP per capita, population, population density and elderly population, female-led countries perform significantly better than male-led countries. Stronger results on deaths than cases indicate that although female-led countries were often as hard hit by the virus as comparable male-led ones – they managed the crisis to result in fewer fatalities. The results are robust whether we consider a single neighbour, the two nearest neighbours or even the three nearest neighbours.

Table 2a: Comparing COVID-outcomes in female-led countries with nearest neighbours (first-step matching)

Specification / Dependent Variable	Nearest neighbour	Two nearest neighbours	Three nearest neighbours
COVID-cases	-22,924.199**	-21,095.944*	-18,640.055*
	(11,463.149)	(11,080.639)	(10,807.616)
Observations	171	171	171
COVID-deaths	-1,942.174**	-1,883.039**	-1,885.419**
	(825.987)	(786.827)	(913.729)
Observations	155	155	155

- *COVID-outcomes (extended-matching)*

To test the robustness of our results, we extend the matching to include three other variables that are likely to have an impact on COVID-outcomes: the condition of the country's health care systems which will impact on its ability to fight the pandemic; openness to tourism which has been professed to affect the rate and speed of transmission, especially in the first quarter before the lockdown; and finally, more liberal and equitable gender norms which may support policy making and compliance in times of crisis.

Table 2b presents the results for these extensions including estimates for the nearest neighbours, for two and three nearest neighbours. Our results remain robust across these estimations, hence in the interests of space we present results only for the nearest neighbour. Overall, we find that both cases and deaths continue to be lower for female-led countries when we match using the three extension variables, with results for deaths being stronger and consistent.

With respect to **health expenditure**, conceptually speaking, we might expect this variable to both influence the number of deaths as well as the readiness with which a country is willing to shut down. In particular, countries with worse health infrastructure may choose to shut down quicker for fear of inability to cope with the impact of the virus. This has, in fact, been the case in many developing countries like India and South Africa. Empirically, however, we find that female-led countries with relatively good health care systems like Germany have led the decision to lockdown. After controlling for this, we find that female-led countries have significantly fewer (1900 fewer) deaths and cases (approximately 22,000 fewer) than countries led by men (column 2, Table 2b).

There has been some concern that countries that are **open to international travel** are likely to be more badly affected by the virus, especially in the weeks before borders were closed. Our results show that, after controlling for openness to travel, female-led countries continue to have an advantage in COVID-19 deaths but they do not experience significantly lower cases.

Finally, we match also by a **gender inequality index** (GII) (to consider the fact that countries that elect women are generally more equal and therefore likely to have better resilience). We find that, even after matching for the gender-equity indicator, female leadership provides an advantage.

Table 2b: Comparing COVID-outcomes in female-led countries with the nearest neighbour (extended-matching)

Variable	Health expenditure	Openness to tourism	Gender norms
COVID-cases	-22,218.469**	-18,112.060	-20,614.353*
	(10,730.846)	(12,517.940)	(11,364.689)
Observations	162	134	150

COVID-deaths	-1,944.306**	-1,654.561*	-1,793.428**
	(834.670)	(919.648)	(874.805)
Observations	147	123	138

Note. Standard errors in parenthesis.
** p<0.05, * p<0.1.

- *Robustness tests*

We carry out further tests to check the robustness of our results. We drop the nations that have been in the COVID-19 spotlight – USA, Germany, and New Zealand – from our sample to see if they might be driving the results and we note that these changes in the sample only strengthen the results (Table 3a).

We also test the robustness of our results to dropping three other countries for various reasons - Switzerland which is led by a Council of members, though in 2020, its President is a woman; Guam and Puerto Rico because they are American protectorates for which Worldometer provides COVID statistics under its mother-nation. Our results remain unchanged in sign and significance (Table 3b).

Table 3a. Comparing COVID-outcomes in female-led countries without nations in the spotlight

Dependent variable	Without the USA	Without Germany	Without New Zealand
COVID-cases	-13,950.271*	-25,059.271**	-22,290.665*
	(7,204.287)	(11,436.389)	(11,732.464])
Observations	170	170	170
COVID-deaths	-1,350.468**	-1,927.662**	-1,859.013**
	(589.843)	(826.502)	(830.593)
Observations	154	154	154

Note. Standard errors in parenthesis.
** p<0.05, * p<0.1

Table 3b. Comparing COVID-outcomes in female-led countries without nations in the spotlight

Dependent variable	Without Switzerland	Without Guam and Puerto Rico
COVID-cases	-23,095.212**	-20,454.107*
	(11,490.947)	(11,471.198)
Observations	170	169
COVID-deaths	-1,948.792**	-1,681.366**
	(831.339)	(780.867)
Observations	154	153

Note. Standard errors in parenthesis.
** p<0.05, * p<0.1

Policy responses to COVID-19 by gender of leader

Our results so far confirm that women-led countries performed better in terms of the number of COVID-deaths experienced and also (though less significantly) in the number of cases. We now turn to consider whether these differences are caused by the immediate policy responses of the leaders. In the early stages of the pandemic, leaders had very few policy instruments that they could deploy. In particular, given the global shortage of testing kits and associated materials, very few countries had sufficient equipment or infrastructure

in place to deploy test and trace policies.[4] This meant that the only feasible policy was lockdown and the only question then was the speed and decisiveness with which this policy was announced. Over time, the effectiveness of setting up a test and trace system might become crucial.

In what follows, therefore, we are interested in whether female leaders locked down countries systematically more quickly than male leaders. It is worth noting that four female-led countries – Iceland, Taiwan, Hong Kong and Myanmar – managed their response without going into a national lockdown. They will therefore not feature in these results and our analysis will relate to the 16 female-led countries that imposed national lockdowns and 99 male-led countries that did the same.

- *Policy responses (first-step matching)*
In trying to understand whether female-led countries locked down earlier than male-led countries we focus on deaths at lockdown – i.e., how many COVID-19 deaths occurred in the country before the leader decided to lockdown the economy. Our matching estimates comparing the timing of lockdown in female-led countries with their closest neighbour are presented in Table 4a. These results indicate that when compared with their closest neighbour, women-led countries closed down significantly more quickly than countries led by men. Female-led countries experienced approximately 24 fewer deaths than their nearest neighbour male-led countries when they locked down. Results remain robust when we match to two or three closest neighbours.

Table 4a. Comparing timing of lockdown in female-led countries with nearest neighbours (first-step matching)

Specification / Dependent Variable	Nearest neighbour	Two Nearest	Three Nearest
COVID-deaths at lockdown	-23.974***	-23.291***	-24.643***
	(7.752)	(8.065)	(8.535)
Observations	115	115	115

Note. Standard errors in parenthesis.
*** p<0.01.

- *Policy response (extended-matching)*
Extending our lockdown model to match for annual health expenditure, openness to tourists and GII, we find again that the women-led countries locked down significantly earlier (at lower number of deaths) than countries led by men (Table 4b). This reflects the fact that women leaders reacted more quickly and decisively to the crisis. Better initial outcomes in female-led countries when compared to male-led ones may have been at least partly because of this difference in responses.

Table 4b. Comparing timing of lockdown in female-led countries with nearest neighbours (extended-matching)

Dependent variable	Health expenditure	Openness to tourism	Gender norms

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[4] Given these issues, we decided not to analyse the testing strategies of leaders. However, raw statistics indicate that tests per million are marginally higher in countries led by women. See Appendix Table A2.

COVID-deaths at lockdown	-24.664***-	-22.357**	-20.552***
	(8.169)	(9.029)	(7.915)
Observations	110	98	105

Note. Standard errors in parenthesis.
*** p<0.01, ** p<0.05.

Why did women leaders respond differently to the COVID-19 crisis from male leaders? In the next section, we will consider the behavioural economics and leadership literature, including feminist scholarship to speculate on the sources of these differences, as well as on their implications.

IV. Discussion

Our results above confirm that women leaders reacted more quickly and decisively in the face of potential fatalities, locking down earlier than male leaders in similar circumstances. While this may have longer-term economic implications, which we cannot test here, it has certainly helped these countries to save lives, as evidenced by the significantly lower numbers of deaths in these countries. Why have women been quicker to lockdown? As discussed earlier, one idea that might have a bearing on our result is that there are gender-differences in attitudes to risk and uncertainty. However, this basic hypothesis has to be nuanced to highlight that while women were less willing to take risks with lives, they were more willing to accept risks in relation to the early lockdown of economies. We also consider learnings from the leadership literature to understand differences in leadership behaviours evidenced by men and women.

Gender differences in attitudes to risk

While risk aversion may explain why women leaders chose to close down their countries significantly early (in terms of the COVID-deaths at lockdown), it does not explain the significant risk that women leaders were prepared to take with their economies by locking down early. Clearly, we need to look beyond the simplistic headline result. It could be that risks manifest differently in different domains – human life vs economic outcomes. If this were true, then women leaders could be seen as being significantly more risk averse than male leaders in the domain of human life, though, in the domain of the economy, these women leaders were clearly prepared to take more risk than male leaders.

We find some support for this idea in studies that examine risk taking behavior when lotteries are framed as losses. For example, Schubert et al. (1999) find that men are more risk averse than women when lotteries are framed as financial losses rather than gains. Moore and Eckel (2006) also find that in the loss-domain gambles, men are more risk-averse and less ambiguity-seeking than women. It could be that the relatively late lockdown decisions by male leaders may reflect male risk aversion to anticipated losses from locking down the economy.

Another strand of the risk literature that is of interest to us considers risk-taking decisions by leaders on behalf of others in their group. Ertac and Gurdal (2012) observe that the women who lead and decide for the

group are no different (in risk attitudes) to women who do not wish to lead. Amongst men, however, those who like to lead tend to take more risk on behalf of the group. Similarly, studies find that while both men and women are often overconfident, men are more overconfident of success in uncertain situations than women (e.g., Barber and Odean, 2001;).

Evidence in psychology also indicates that women are seen to respond more strongly and intensely than men when anticipating negative outcomes (e.g., Fujita et al., 1991). This can affect their utility of a risky choice and hence their decision. For example, if a negative outcome is anticipated as being worse by women than by men, they will be more risk averse in situations like the current pandemic. Men, on the other hand, were found to respond with anger to negative experiences. While anger is seen to make men less cautious about future gambles, women respond with caution, making them more prudent in their beliefs and restrained in their actions (Lerner et al. 2003).

The neuroscience literature, in its turn, indicates that there could be sex differences in empathy which cannot be explained as cultural derivatives of socialisation but have deeper neurobiological drivers. Christov-Moore et. al., (2014) find that there are important quantitative gender differences in the networks involved in affective and cognitive forms of empathy, as well as a qualitative divergence between the sexes in how emotional information is integrated to support decision making processes.

Gender difference in leadership styles

It is likely that leadership characteristics other than risk attitudes may also systematically differ between men and women. The early literature associated leaders with 'masculine' attributes characteristic of the stereotypic male. For example, Rost (1991) examines 221 definitions of leadership from the last century and concludes that leadership has most frequently been described as "rational, management-oriented, male, technocratic, quantitative, cost-driven, hierarchical, short-term, pragmatic and materialistic". Of course, women can display these supposedly 'male' management traits and vice versa.

Eagly and Johnson (1990) conduct a meta-analysis of research comparing male and female leadership styles and conclude that evidence can be found for both the presence and absence of differences between the sexes. While research in organisational studies found little difference between male and female leadership styles, laboratory experiments and assessment studies found evidence to suggest that leadership styles were somewhat gender stereotypic with men likely to lead in a 'task-oriented' style and women in an 'interpersonally-oriented' manner. Consistent with this finding, women tended to adopt a more democratic and participative style and a less autocratic or directive style than men. These attributes have been seen as key in a number of studies, especially in managing a crisis (e.g., Waugh and Streib 2006;).

In another meta-analysis of 45 studies of transformational versus transactional styles of leadership, Eagly, Johannesen-Schmidt and van Engen (2003) find a small overall tendency for women to be more transformational than men and show a tendency towards a style of leadership that is interpersonal, forming and nurturing new relationships with others. Male leaders are more likely to exhibit transactional leadership associated with "management by exception", a tendency to passive decision-making that avoids taking action until things get really critical. This finding coordinates with our results that women national leaders tended to act more quickly in terms of locking down their economies.

Evidence from the leadership literature also suggests that good communications skills are important for women to be chosen as leaders (Lemoine, Aggarwal, Steed, 2016). Indeed, the decisive and clear communication styles adopted by several female leaders have received much praise in the ongoing crisis). Thus, Norway's Prime Minister, Solberg, spoke direct to children answering their questions, while the New Zealand Prime Minster, Ardern, was praised for the way in which she communicated and for checking in with her citizens through Facebook Live.

Thus, our results could be associated with women being risk averse with respect to lives and having a clear, empathetic, interpersonal and decisive communication style. These findings suggest that it may be useful to study leadership using a 'contextual' lens within which women leaders can gain respect and credibility not by 'leaning-in' but by leading with their own unique style of leadership. A demand for diversity in leadership is then not about affirmative action, but a demand for a range of abilities to manage a range of challenges.

V. Conclusion

In this paper, we ask if there is a significant and systematic difference by gender of the national leader in the number of COVID-cases and deaths in the first quarter of the pandemic. We also examine differences in policy responses by male vs. female leaders as plausible explanations for the differences in outcomes. We use a specifically constructed dataset for 194 countries for our analysis. Our findings show that COVID-outcomes are systematically and significantly better in countries led by women and, to some extent, this may be explained by the proactive policy responses they adopted. Even accounting for institutional context and other controls, being female-led has provided countries with an advantage in the current crisis.

Examining what is already known about the gender differences in behaviour from a variety of disciplines gives us some insights into the behaviour of female and male leaders in tackling the current pandemic. While the factors affecting outcomes are likely to be complex, the attributes of the leader are especially important early in a crisis. Our results indicate that the pandemic posed a very different kind of challenge and one that is likely to become more common. Given that countries and organisations face varying challenges, diversity

in leadership approaches will help to mitigate risk. Such diversity is not simply a matter of equity but also a matter of effectiveness in the face of multi-dimensional challenges.

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Appendix

Table A1: OLS results for COVID-cases and deaths

Covariates	Total cases	Total deaths
Female-led	-57,264.744*	-4,290.402*
	(32,266.790)	(2,240.180)

GDP/pc	1.948***	0.134***
	(0.566)	(0.039)
Population (ln)	23,163.657***	1,672.671***
	(4,979.229)	(366.874)
Population density	-6.172	-0.702
	(5.210)	(0.734)
Population 65 years and over	1,344.805	186.337
	(1,701.372)	(118.567)
Constant		
	-378,016.156***	-28,256.830***
	(81,636.534)	(6,062.164)
Observations	171	155
R-squared	0.191	0.224

Note. Standard errors in parenthesis
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A2: Summary statistics for COVID-19 tests by gender of leaders

	Female-led countries					Male-led countries				
Study variable	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Tests per million	18	33,053	40,232	268	166,818	155	20,587	32,421	4	181,466

Source: Dataset constructed by authors from various sources.