78th Economic Policy Panel Meeting

19-20 October 2023

Women in Political Power and School Closure During Covid Times

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August 28, 2023

Abstract

This study explores the relationship between women's representation in political power and school closures during the COVID-19 pandemic. Using a cross-country dataset in Europe, we document a striking negative relationship between the share of female members in national governments and school closures. We show that a one standard deviation increase in female members of national governments is associated with a reduction in the likelihood of school lockdowns by 24% relative to the average share of school closures. This result is robust to an extensive set of sensitivity checks. We attribute this pattern to a higher awareness of female politicians about the potential costs that school closures imply for families.

1 Introduction

The COVID-19 crisis has carried an unprecedented and unexpected disruption to people's everyday life. In response, governments in Europe as well as worldwide adopted containment and public policy measures to limit in-person contact among the population, including, for instance, travel restrictions, stay-at-home requirements for infected people and face coverings in public life. One of the first and most restrictive containment measures during the COVID-19 pandemic was the closing of schools.[1] Figure 1 shows that during the peak of the first wave in April 2020, 85% of the European Union (EU) countries closed their schools completely. In the following months and the subsequent waves, the pattern became less homogeneous, with some countries such as Italy continuing to close schools during the waves of the pandemic, while other countries such as Denmark keeping schools open despite high infection levels. A natural research question is therefore the following: what are the reasons for this variation across countries and over time?

In this paper, we address this question by exploring, for the first time, the role of women's representation in politics as a potential driver of school closures. Our motive for this investigation rests on recent and growing empirical evidence indicating that a politician's identity, including his or her gender, may affect policy choices and outcomes (Besley and Coate, 1997; Lippmann, 2022; McGuirk et al., 2023). Previous experimental as well as survey-based studies on the role of a politician's gender have documented significant differences in social preferences and policy priorities (see, for instance, the recent review by Hessami and da Fonseca, 2020). These differences, which contra-

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[1]The main argument used to justify school shutdowns was that they would help reduce the spread of the coronavirus pandemic by preventing social interactions among children in schools. To date, the resulting empirical evidence about the beneficial role of school closures as a containment measure remains rather inconclusive (see, for example, Goldhaber et al., 2022; Isphording et al., 2021; Lessler et al., 2021; Vlachos et al., 2021; von Bismarck-Osten et al., 2022). For instance, while Lessler et al. (2021) find that in-person schooling is associated with increased risk of COVID-19 spread, Diederichs et al. (2022) show that opening schools under mandatory testing rules can provide a means to counter the spread of the disease.

dict the classical median voter theorem, are consistent with a citizen-candidate model in which politicians have distinct political preferences, ideological or gender-wise, and cannot make binding commitments (Besley, 2005; Besley and Coate, 1997; Osborne and Slivinski, 1996). In the context of the COVID-19 pandemic, a substantial body of work has analyzed the widespread consequences of school closures on children and families. However, to the best of our knowledge, there are no studies that have examined the potential role of women in political power in mandating strict school and childcare closures - which disproportionately affected women - during the COVID-19 pandemic.

We fill this research gap by investigating the relationship between school closures and women in government using a new dataset for Europe covering the period since the onset of the COVID-19 pandemic in March 2020 until September 2021. In practice, our research design exploits the country-level variation in the intensity of female representation in national governments in the pre-pandemic year of 2019. The results of our analysis suggest a negative and significant relationship between female members in national governments and school closures. A one standard deviation increase in female members of national governments is associated with a reduction in the probability of school closure by 5.7 percentage points, which corresponds to 24% of the average share of school closures. This result is robust to an extensive set of tests, including different samples, variable definitions, functional specifications and control strategies. We also provide suggestive evidence on some of the possible mechanisms underlying the gendered pattern of mandating school closures. In particular, we find results in line with a higher awareness of female politicians about the potential costs that school closures imply for families, and in particular for working mothers with young children.

Our study contributes to the extensive research analyzing how female representation in politics may affect policy decisions and the allocation of public expenditures in many different contexts (see, for example, Baltrunaite et al., 2019; Baskaran and Hessami, 2023; Bhalotra et al., 2023; Bhalotra and Clots-Figueras, 2014; Chattopadhyay and Duflo, 2004;

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Chen, 2021; Funk et al., 2022).[2] In developing countries, research has documented that politicians' gender affects public policies, particularly in the domains of health and education (see, e.g., Chattopadhyay and Duflo, 2004; Clots-Figueras, 2011, 2012; Bhalotra and Clots-Figueras, 2014). However, the empirical evidence remains rather inconclusive in high-income countries. On the one hand, Ferreira and Gyourko (2014), Bagues and Campa (2021) and Carozzi and Gago (2023) fail to find evidence that more women as policy-makers in the US and Spain can affect policy choices such as the size or composition of the public expenditure. On the other hand, Lippmann (2022) and Baskaran and Hessami (2023) provide evidence for France and Germany that increased female representation in political leadership positions can result in policy change related to children and health. This suggests that the gender of politicians might be a relevant factor in policy decisions only in specific contexts.

The specific context we address in our paper is the COVID-19 pandemic and the related containment measures, which have sparked a growing literature studying female political leadership in times of crisis (Abras et al., 2021; Bruce et al., 2022; Garikipati and Kambhampati, 2021; Piscopo, 2020). Many studies suggest that women leaders in politics have been more successful than men in combating the pandemic. Garikipati and Kambhampati (2021) construct a dataset for 194 countries including the gender of the national leader and find that countries led by women experienced fewer COVID-19 cases and deaths in the first few months of the pandemic. Bruce et al. (2022) document that the election of a female leader in Brazilian municipalities led to a significant decline in the number of deaths and hospitalizations from COVID-19. However, the study by Chauvin and Tricaud (2023) suggests that a more nuanced view about the role of female politicians for the dynamics of the pandemic is necessary: their results suggest that the presence of a female mayor in a Brazilian municipality led to more COVID-19 deaths at

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[2]There is also growing research on the role of higher female representation in leadership and decision-making roles on outcomes outside of politics in domains, such as business, academia and media (recent literature reviews are provided by e.g., Azmat and Boring, 2020; Bertrand, 2018).

the beginning of the pandemic, but to fewer deaths at the end of the pandemic; which is consistent with a net negative cumulative effect. Crucially, while these papers focus on the gender of a country's political leader and how this (female) leader influenced the pandemic performance in terms of cases, deaths and hospitalizations, we assess the role of women's representation in political power, i.e., the share of female members of national governments in each country, on the likelihood of implementing a specific COVID-19-containment measure, namely school closures.

Our study is also implicitly related to the growing literature on the health and socio-economic costs associated with school closures. There is mounting evidence that school closures have had a negative impact on a large array of outcomes of children and their parents, and mothers in particular. Parents reported lower levels of well-being and adverse mental health symptoms, and especially mothers with young children reduced their participation in the labor market due to the increased childcare responsibilities associated with school disruptions (Albanesi and Kim, 2021; Croda and Grossbard, 2021; Huebener et al., 2021). At the same time, children suffered from significant learning and developmental losses and a deterioration in their mental health (Engzell et al., 2021; Giuntella et al., 2021; Grewenig et al., 2021). Engzell et al. (2021) find that overall, students in grades 4 to 7 in the Netherlands have encountered large learning losses in math, spelling, and reading, and Grewenig et al. (2021) document that students dedicated significantly less time to learning activities during the German lockdown in spring 2020 compared to their pre-lockdown period. Werner and Woessmann (2023) underscore how in the absence of effective educational policy responses, the toll of school closures on children is likely to have long-term consequences on their overall development and labor market prospects. In addition, several studies document that the costs of the pandemic are not only unequally distributed according to gender in the population but also disproportionately borne by most vulnerable groups, such as children from low-income families, single parents and minorities, thereby contributing to exacerbate pre-existing

socio-economic inequalities in the population (see, among others, Adams-Prassl et al., 2022, 2020; Agostinelli et al., 2022; Brodeur et al., 2021; Croda and Grossbard, 2021; Danzer et al., 2021; Fuchs-Schündeln, 2022).

The paper is organized as follows. In Section 2, we present a description of the data and the analysis methods. In Section 3, we present our main results on the relationship between women's representation in politics and school closures. In Section 4, we discuss the socio-economic implications of our findings. Section 5 concludes the paper.

2 Data and Methods

2.1 Data

We use data from various sources to construct our own weekly panel of 28 European countries. Our main source of data is drawn from the Oxford COVID-19 Government Response Tracker (OxCGRT), a project conducted by the Blavatnik School of Government from the Oxford University. This dataset collects key information on policies that governments imposed in response to the COVID-19 pandemic for several countries on a daily basis since January 2020. For a detailed description of the dataset, see Hale et al. (2021). We collapse the original country-level daily data at the week level across all countries.

The OxCGRT data have a number of unique features that make them particularly attractive for our analysis. First, the OxCGRT offers harmonized information on a systematic set of restrictions from different countries, allowing us to conduct a cross-country analysis. In this study, we focus on the EU-28 member states,[3] where a variety of policy measures have been adopted over the course of the pandemic. Second, the OxCGRT is

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[3]Namely, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom. While UK officially left EU on February 1, 2020, it is still included our sample, and we refer to this group of countries as EU-28.

one of the most comprehensive datasets that follows the national governments' policies in response to the spread of COVID-19 infections since the start of the pandemic. These policies cover three main areas: containment and closure, economic policies, and health policies. Of particular importance for our study is the fact that the OxCGRT collects data on school closings, differentiating between four categories measured on an ordinal scale, namely, "no measures"; "recommend closing or all schools open with alterations"; "require closing (only some levels or categories)"; "require closing all levels". We use this information to create our main outcome of interest: a binary variable that equals one in a given week and country if all schools were required to close due to COVID-19 pandemic.[4]

The OxCGRT database also records the number of reported cases and deaths attributable to COVID-19, which are sourced from open datasets at the European Centre for Disease Prevention and Control and the John Hopkins University. Our primary measure of the COVID-19 pandemic is given by the average number of cases per week, which we computed over 100,000 inhabitants in 2019 in the respective country.[5]

Finally, in order to shed light on the potential mechanisms, we use five additional indexes provided in the OxCGRT database: policies on the use of face coverings; restrictions on gatherings; limitations on public transport; restrictions on international traveling; and the overall stringency index. The items for these variables are listed in Table A.6 in the Appendix and are used to construct five separate variables of policies and restrictions, which serve as additional outcome variables in our mediation analyses.

Our second source of data is the Gender Statistics Database (GSD) of the European Institute for Gender Equality (EIGE) – for an overview, see EIGE's Gender Statistics Database (2023). Since 2003, this dataset has provided quarterly data on the number of

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[4]The OxCGRT data contains daily information on school closing in the respective countries. To create our binary variables, we collapse the daily information at the week level by keeping the maximum value of the indicator for each week. Results remain unchanged if we collapse the daily information by using the most frequent observation within a week.

[5]Information on population in each country comes from Eurostat.

women and men in key decision-making positions in several European countries and across a variety of life domains, including public administration, judiciary, business and finance, media, science and research, sports, transport, and, most importantly for our study, politics. Specifically, the data provide information about the share of female and male politicians.[6] This is essential, because it allows for the analysis of the effects of women's representation in national governments. Therefore, our key explanatory variable represents the proportion of female members of national governments in each country. The focus is on governments, as the decisions on school closures in almost all cases were made by governments, not by parliaments.[7] Moreover, as the decision to shutdown schools during the pandemic has generally not been decided by a single politician in the countries included in our sample, we use the share of female representation in governments. Since women's political representation could be endogenous to the pandemic, we collect this information in the fourth quarter of 2019 because it pre-dates the disruption to everyday life due to the COVID-19 pandemic.[8]

From Eurostat we use country-level information on economic and labor market characteristics, such as gross domestic product (GDP) per capita and female employment rate, and on demographic and social characteristics, such as total fertility rate, the total expenditure in primary, lower secondary and upper secondary education (as a percentage of the GDP), access to broadband Internet, the old-age dependency ratio, and the percentage of the population (aged 15-29) living in overcrowded houses. Information on the country-level contextual variables refers to 2019.[9]

Our sample covers the period from March, 1 2020 to September, 30 2021, thereby

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[6]In particular, the GSD dataset provides information at the European, national, and subnational (e.g., regional and local) levels.

[7]For example, in France President Emmanuel Macron announced on March 19, 2020 that the French government has decided to close all schooling establishments from March 23 to prevent the spread of COVID-19.

[8]Results are robust to using the average of our main explanatory variable during 2019.

[9]Information on youth overcrowding in the United Kingdom has been collected in 2018.

encompassing the first three COVID-19 periods in Europe.[10] It contains a balanced panel of 2,352 country-by-week observations collected for the EU-28 member states.[11] Descriptive statistics for our sample are presented in Table 1. The proportion of school closings is approximately 23%, with substantial variation across countries and over time (see Figure 1). The average share of women in government is close to 31% and displays no time variation, since we measure this variable in 2019, i.e., before Europe was hit by the COVID-19 pandemic.

In Figure 2, we document the association between school closures and the share of women in national governments. The emerging pattern is that the share of women in governments is negatively correlated with school closings. Interestingly, two groups of countries deviate somewhat from the pattern: the first group, Italy, Germany and the United Kingdom, is characterized by a relatively high share of both school closure and women in national governments; and the second group, Finland and Sweden, with school closings being equal to zero throughout the entire period.[12] To minimize the risk that these two sets of countries are driving our results, we separately exclude these two groups of countries from the sample in our sensitivity analyses.

2.2 Model Specification

To examine the relationship between school closure and women in governments, we estimate the following linear probability model:

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[10]The three periods correspond to the first 84 weeks of the pandemic. We do not consider infections waves, as their timing strongly differed across European countries. Therefore, we make use of three periods based on the aggregated COVID-19 cases. For details, see Figure A.1 in the Appendix. We define the first period as starting from March 1, 2020 and ending in June 30, 2020 (i.e., weeks 1-19). The second period starts in July 1, 2020 and ends in June 30, 2021 (i.e., weeks 20-69). The third period starts in July 1, 2021 and ends in September 30, 2021 (i.e., weeks 70-84).

[11]As mentioned earlier, it is worth remarking that our key explanatory variable, defined as the share of female members in national governments in the pre-pandemic year of 2019, varies only across countries.

[12]Furthermore, in Figure A.2 in the Appendix we document that the residualized relationship between school closures and the share of women in governments (i.e., after controlling for COVID-19 cases, week dummies, and the other country-level contextual covariates used in our regressions) closely resembles the unconditional pattern in Figure 2.

$$Y_{ct} = \alpha + \beta \text{ Women in Government}_{c2019} + \gamma COVID_{ct} + \lambda X_{c2019} + \tau_t + \epsilon_{ct} \qquad (1)$$

where the dependent variable Y_{ct} is a dummy coded as one if schools in a country c and week t have been fully closed. Our explanatory variable of interest is Women in Government$_{c2019}$, which represents the proportion of female members of national governments in a country c in the fourth quarter of the pre-pandemic year of 2019. Our measure of women in national governments is expressed in units of its standard deviation in all our specifications. Accordingly, the coefficient of interest is β, which indicates the role of women's representation in national governments.

$COVID_{ct}$ captures the average number of cases registered per 100,000 people at the country and week level. X_{c2019} is a vector containing a wide range of country-level labor market, social and demographic characteristics, such as the logarithm of GDP per capita, access to broadband Internet (to account for cross-country differences in economic conditions and modern infrastructure), the female employment rate (indicating female labor market attachment and potential degree of stress among women due to school and childcare closures), total fertility rate (which might also reflect a society's general attitude towards children), the total expenditure in primary, lower secondary and upper secondary education as the share of the GDP (to control for the political importance given to education in a country), the old-age dependency ratio (as politicians in countries with more older voters might prioritize policies protecting the elderly), and the percentage of the population (aged 15-29) living in overcrowded houses (indicating potential reluctance to school closures due to limited living and learning space at home). Because many of these country-level characteristics are potentially endogenous, as they might be affected by the pandemic themselves, we use control variables measured in 2019 before the onset of the pandemic. Equation (1) also contains week fixed effects (τ_t) to account for possible trends in our outcome. Finally, ϵ_{ct} represents an idiosyncratic error term. Throughout the analysis, we cluster standard errors by country to account

for potential serial correlation over time within a country.[13]

At this stage, it is worth remarking that our analysis does not leverage any quasi-experimental variation in the share of female representatives nor relies on a fixed effects approach given the cross-sectional variation of our main explanatory variable. Nonetheless, while we acknowledge that our investigation is vulnerable to endogeneity concerns thus cautioning against a causal interpretation of our results, we attempt to deal with this issue in three ways. First, we decided to collect information on the key right hand-side variable of women in governments in the pre-crisis year 2019 because it pre-dates the disruption to everyday life due to the COVID-19 pandemic. If instead we had used a contemporaneous version of this variable over the course of the pandemic, during which it varies only marginally due to the limited number of elections, women's representation in politics would also have picked up the effect of the health crisis. Second, as mentioned above, we condition our analysis on a rich set of pre-crisis country-level contextual variables. Such country-level contextual variables are likely to mitigate worries about confounding factors across countries that might bias our results. Third, we perform an extensive series of robustness and specification checks that corroborate the central finding (see Section 3.1).

3   Results

In Table 2, we explore the relationship between the proportion of female members of national governments and school closure using an ordinary least squares (OLS) estimation of Model (1). In column 1, we report the coefficient of women's representation in the national government without other controls: the estimate suggests that a one standard deviation increase in female members of national governments is associated with a decrease in the probability of school closure of 4.4 percentage points, which is equivalent

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[13]Constructing the standard errors by bootstrapping results over countries does not substantially alter the significance of the estimated coefficients (see Table A.1 in the Appendix).

to approximately 18% relative to the mean outcome.

In column 2, we include a large set of pre-determined controls at the country level to account for potential confounding factors, as detailed in the previous section. We find that women's representation in national governments remains negatively and significantly associated with school closings. Indeed, the estimated relationship becomes slightly stronger, and the estimate of -0.053 corresponds to a decline of approximately 23% of the mean of the dependent variable. The coefficient is also robust to the inclusion of the country-level average of registered cases attributable to COVID-19 per 100,000 inhabitants in a week (see column 3).[14] When controlling for week fixed effects (see column 4), the estimated coefficient of interest is virtually unchanged relative to the previous specification. A one standard deviation increase in female members of national governments reduces the likelihood of school closures by 5.7 percentage points, which corresponds to 24% of the average share of school closures. To gauge a sense of the economic magnitude of the estimated effect, we consider the distribution of the variable representing women in national governments: a change of one standard deviation corresponds roughly to moving from the median to the upper quartile of its distribution. This would correspond approximately, for instance, to a change from the share of women in government in Portugal to the level of female political representation in Austria (see Figure 2).[15]

In order to inspect how this estimated relationship evolves over the course of the pandemic, we augment Model (1) with the interaction between the variable denoting female representation in national governments and week dummies. Figure 3 illustrates initially

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[14]Including the average number of registered COVID-19 cases per week as a control variable is problematic as it could be potentially affected by school closures. Moreover, the comparability across countries is likely to be limited due to differences in testing. Table A.2 in the Appendix shows the robustness of our findings to the inclusion of alternative, also potentially endogenous, measurements of COVID-19 among the set of controls, such as the country-level number of COVID-19 deaths per 100,000 inhabitants (see column 1), and excess mortality attributable to COVID-19 per 100,000 inhabitants (see column 2). In columns 3 and 4, we show that the inclusion of one-week or two-week lagged values of the COVID-19 cases does not materially affect the point estimate.

[15]As shown in Table A.3 in the Appendix, the average marginal effects obtained using a Probit or a Logit model remain substantially unchanged.

strong gender differences in the effects of women's representation in politics on school closures, with a higher share of women in political power being associated with significantly less school closures compared to governments with a higher fraction of males. However, three months after the start of the pandemic, the initial gender gap attenuates over time and the pattern becomes no longer statistically distinguishable from zero at the end of the first period. Over the course of the second period, we initially observe no evidence of significant gender differences in school closures; however, towards the end of the second period (i.e., February and March 2021) significant gender differences emerge again, with women being significantly less likely to support the closure of schools. In the third period, we no longer detect any gender gap with respect to school closures, possibly because vaccines became widely available and school closures were relatively rare in general.

3.1   Robustness Tests

To assess the robustness of our findings, in Table 3 we report the sensitivity of our estimates to the use of different samples or specifications (see, respectively, Panels A and B). Starting from Panel A, in column 1 we check the robustness of our results when excluding Germany, Italy and the United Kingdom from our sample. The major concern here is that as we noted previously, this group of countries follows a somewhat different pattern from the bulk of other countries. Reassuringly, the magnitude of the coefficient remains similar to the benchmark specification (see column 4 of Table 2). Second, another concern regards the sensitivity of our findings to the exclusion of Sweden and Finland, two countries in our sample that never experienced school closure. The result presented in column 2 confirms the negative and significant (at the 10% level) effect of women's representation in national governments on school closure, with the magnitude being not statistically different from our baseline using the full sample. This suggests that the

estimated association is not driven by these particular countries.[16] Third, to investigate the heterogeneous impacts over the course of the COVID-19 pandemic, in columns 3 and 4 we report the estimated coefficient when we separately examine the first and the second period of the pandemic. In both periods, a higher women's share in national governments is significantly negatively associated with school closures and the estimates are not significantly different from each other.[17] In column 5, we show that excluding the summer months of July and August from the sample, when most countries have their school summer breaks and thus school closures might be less relevant, does not substantially alter our key finding.

To further test whether our main result varies with the intensity of the pandemic, we estimate regressions distinguishing by pre-pandemic indicators and measures of pandemic severity. The results of this analysis are reported in Table A.4 in the Appendix. In Panel A, we investigate whether the estimated coefficient of interest also holds in countries one would expect to be hit harder by the pandemic due to some pre-existing contextual characteristics at the country level. In particular, we test whether the effect of women in governments changes between countries with different old-age dependency ratios and different shares of health care expenditures relative to the GDP in 2019.[18] In both cases, we do not observe any significant difference, suggesting that the impact of female politicians on school closure is independent of the pre-existing vulnerability of societies. In Panel B, we assess whether the effect of interest changes with the level of COVID-19 infections and deaths within countries. Here, we estimate regressions distinguishing by the level of COVID cases, the level of excess deaths and the popularity of

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[16]Furthermore, in Figure A.3 in the Appendix we show that our results still hold when we drop one country at a time, allowing us to rule out the possibility that potential concurring shocks happening in single countries are the main drivers of our findings. The robustness of our finding to the exclusion of Sweden is particularly important in our setting because compared to the other Nordic countries, the Swedish Public Health Agency has more legal autonomy, thereby directly affecting policy decisions to combat the COVID-19 pandemic (see Ellingsen and Roine, 2020, for a review of how Sweden responded to COVID-19 relative to the other Nordic countries). In additional analyses, we have estimated our benchmark specification after dropping the Scandinavian countries. Our results are wholly unchanged.

[17]Alternative cut-offs for the periods leave the results substantially unchanged.

[18]For the United Kingdom we use data from 2018. See Appendix table A.6 for details.

the Google search term "COVID deaths" within countries. Doing so, we once again do not find any significant difference suggesting that our main result also holds in countries hit the hardest by the pandemic.

Next, we assess whether our estimates are spuriously capturing some other confounding factors (see Panel B of Table 3). First, we test whether our results are reflecting some underlying social norms or cultural differences, which may promote women in politics and also prioritize children's education. To do this, we add national level indicators for attitudes towards gender roles (see column 1).[19] Second, in column 2 we include fixed effects for larger European regions (i.e., North, South, West-Central, East-Central Europe). Importantly, our main finding is substantially robust both to the inclusion of gender norms and any time-invariant heterogeneity across European regions, such as potentially large cultural differences. In column 3, we include a set of linear country-specific time trends to account for possible unobserved cross-country differences in school closures over time. Reassuringly, the estimate is roughly in the same ballpark as the baseline coefficient. Then, in column 4 we show that our result is not affected when controlling for the share of vaccinated adults in the population, which may have reduced potential transmission vectors in schools. Vaccination rates might also capture some unobserved cross-country differences in general attitudes towards COVID-19 containment policies. To capture the latter more directly, we make use of Google Trends and collect country-specific weekly data using the generic search term "COVID deaths". The search term's popularity over time serves as a measure for worries about COVID-19 and the demand for public containment measures. Results reported in column 5 show that increasing COVID-19 concerns are, as expected, positively correlated with school closures. Reassuringly, their inclusion does not affect our main coefficient of interest.

So far, our results point towards a strong negative association between women's share in government and school closures during the COVID-19 pandemic. Does this finding

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[19]The two controls we include in our analysis are an indicator for gender norms (traditional vs. more egalitarian gender role attitudes) and an overall gender equality index (see Table A.6 for details).

reflect the decision-making by female political leaders? Or is our estimated relationship simply reflecting a strong representation of women among top decision-makers in other domains of society? To test this, we dig deeper into the role of women in power by examining the link between school closures during the pandemic and the proportion of women in decision-making positions in other areas of society. Specifically, in Panel A of Table 4 we re-estimate our main specification, replacing our key explanatory variable of women in governments sequentially by the share of women in decision-making positions in (a) media, (b) judiciary, (c) science and research, and (d) business and finance.[20] For none of these alternative measures of female representation do we find evidence of a significant correlation between school closure and the share of women in decision-making positions outside of politics. This finding suggests that female politicians had an important role in the political decision making process related to school closures.[21]

A further piece of evidence in line with this interpretation is reported in Panel B of Table 4. Here, we leverage additional information in the GSD dataset and show that our results are overall robust to the use of several alternative measures of female political representation. First, we consider the share of women among senior ministers only, which is a more restrictive measure for women's share in national government (see column 1). Second, we replace our main explanatory variable by the proportion of women in national parliaments (see column 2). Moreover, we examine measures of female political representation in subnational levels, such as women in regional parliaments or in local administrations (see columns 3 and 4, respectively).[22] These results suggest that female political representation at both the national and regional level is strongly negatively associated with school closures. Overall, this finding could be explained by well-functioning information flows among women across political levels, involvement of

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[20]See Table A.6 in the Appendix for a detailed description of the variables.

[21]Furthermore, Table A.5 in the Appendix shows that controlling for these different shares of women in powerful positions in other domains of society – separately in columns 1 to 4, and all together in column 5 – does not alter our main result.

[22]This is of particular interest, as in some countries such as Germany regional governments were involved in decisions on school closure during the pandemic.

regional politicians in school closure related decisions, or by the possibility that female representation at lower political levels might positively spill over to higher levels (and vice versa), e.g., Baskaran and Hessami (2018); Brown et al. (2022).

3.2 Exploring Alternative Explanations and Potential Mechanisms

What could be alternative explanations or potential channels underlying the observed relationship between women in political power and school closure during the pandemic? We present suggestive evidence on potential mechanisms in Tables 5, 6 and 7.

First, the results might reflect particular structural differences in the characteristics of women and men in political power. For instance, if left-wing parties with a stronger focus on gender equality have a higher share of women politicians, and if left-wing governments were more reluctant to close schools during the pandemic, our results might reflect left-party membership (of women in political power) rather than the female gender of the politicians as such. However, when we add controls for the political orientation of the parties in government in a given country to the baseline specification, our main result remains virtually unchanged (see column 2 of Table 5). Thus, (left-) party membership of women in power does not seem to drive our findings.[23] Another possibility is that female politicians are more likely to have children than male politicians and therefore might have a different behavior regarding the possible consequences of school closures. In this case, the coefficient for the proportion of female members in national governments might capture the influence of having children rather than the gender of policymakers. To test this hypothesis, we collected country-level information on the children of all female senior politicians from alternative data sources.[24] If we add the share of senior female politicians with children among all senior ministers to the

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[23]To measure political orientation of parties in governments, we used three main categories: left-wing, centrist, and right-wing governments.

[24]We rely on data from official governmental profiles of the politicians, interviews, and openly accessible sources, e.g., Wikipedia.

model (see column 3 of Table 5), our coefficient of interest remains significant and does not change in magnitude (see column 1 of Table 5). This provides first evidence that our results are not driven by structural differences between male and female politicians with respect to having children. Another potential structural difference could be that females politicians are more likely than their male counterparts to attain leadership positions which are related to education issues, and in this function, they will oppose school closure more than men. However, controlling for whether the minister of education is female (see column 4 of Table 5) does not affect our result in any meaningful way.[25]

Second, the results could be driven by gender differences in political preferences of policymakers. Quasi-experimental evidence for India (Chattopadhyay and Duflo, 2004), France (Lippmann, 2022) and Germany (Hessami and da Fonseca, 2020) shows that gender differences in policy choices may partly represent legislators' gender identity. A larger representation of women in national governments could thus result in relatively more weight being given to women's issues in the political agenda. Women in Europe are still more involved in childcare than men (Huebener et al., 2021), and the availability of day-care centers and external care of young school children proves a crucial factor for the well-being of working mothers (Schmitz, 2020). Moreover, incompatibilities between family and work obligations might explain the lower representation of female politicians in Germany (Baskaran and Hessami, 2022). In line with this, recent research on the COVID-19 pandemic finds that women were indeed more adversely affected by school closures than men, especially due to the extra childcare and homeschooling responsibilities undertaken by women (Croda and Grossbard, 2021; Danzer et al., 2021; Goldin, 2022). Against this background, the negative consequences of school closures on mothers, families and children might be better anticipated and more internalized by female rather than by male politicians.

To explore this hypothesis, we perform an additional analysis. If female policy mak-

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[25]The results are similar when controlling for whether the minister of health is a woman.

ers are generally comparatively more active on women's issues than male politicians (Lippmann, 2022), the anticipated negative repercussions of school closures should be especially salient among female politicians in countries which have both a comparatively high maternal labor force participation rate and - at the same time - a high reliance of working parents on external public childcare. Our heterogeneity analysis between the countries with high (i.e., above the median) maternal employment and high childcare enrollment rates on the one hand and all other countries on the other hand reveal that the impact of women in political power is indeed significantly larger in the former group than in the latter (see Panel A of Table 6).

If identity is the driving force, one might expect the gender of government members to play a greater role in parliamentary regimes than in presidential regimes, since individuals holding government positions have greater discretionary power over political decisions. However, we do not find any significant difference by type of government (see Panel B of Table 6). This result should be interpreted with caution since in our dataset we have very few countries with a presidential system of government.[26] Additionally, one might expect politicians' gender identity to be less important when elections are imminent, as efforts to win re-election might then dominate their own preferences. To test this idea, we have distinguished between situations with close elections and those with more distant elections. We then separately estimate the effects of female representation in politics using a cutoff point of 8 months, respectively 32 weeks, before the next national election.[27] Doing so, we do not find evidence that the effect varies significantly according to the closeness of the election (see Panel C of Table 6).

Finally, we want to rule out that our results could reflect a general reluctance towards containment measures by female political leaders. In this case, we would expect also to find the same gender pattern when focusing on more "gender-neutral" contain-

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[26]The countries in our sample with a presidential system are Cyprus, France, Lithuania, Poland Portugal and Romania. With the exception to Cyprus, the others have a semi-presidential system.

[27]Results are similar in nature if we use different cutoff points (i.e., four months or one year).

ment policies. However, as shown in Table 7, in contrast to school closures, we do not find evidence of a significant correlation between the share of women in governments and relatively gender-neutral COVID-19 policies, such as face coverings (see column 1), restrictions on gatherings (see column 2), close public transport (see column 3), or restrictions on international travel (see column 4). As a last step, we analyze whether our results might reflect gender differences in the likelihood of implementing very restrictive containment policies. For this purpose, we consider the overall stringency index, which is a composite index of the general strictness of all government policies (including school closures). The results displayed in column 5 of Table 7 reveal no significant gender differences, suggesting that the share of women in government is not systematically related to the overall strictness of the COVID-19 containment policies.

Altogether, our findings are in line with the view in which female politicians were more reluctant to (longer) school closure than male politicians because they were more aware of the negative consequences of school closures than their male counterparts.

4 Discussion

What are the implications of our findings for the socioeconomic outcomes of children and families and for society in general? Given the lack of exogenous variation in the share of female representatives in our cross-sectional study design, we can only draw some tentative and speculative conclusions by relating our findings to the rapidly emerging literature on the benefits and costs of school closures during the pandemic.

Our results document a significant negative relationship between female representation in political power and school closures during the COVID-19 pandemic in European countries. The average government in our sample comprises only 30% of female members; in some countries the female share among political decision-makers is below 15%. What kind of pattern would we expect to find in a hypothetical counterfactual scenario

with comparatively more female representation in European governments? If we assumed the estimated relationship to be causal in nature, we would expect to observe significantly fewer school closures in all countries. In what follows, we will discuss the potential consequences of such a negative relationship on socio-economic outcomes, starting with evidence on the effectiveness of school closures as a containment measure against the spread of the new corona virus and health implications.

The evidence on the benefits of school closure as a measure against the spread of the SARS-CoV-2 Corona virus is rather mixed, with some studies finding the intended negative impact on the spread of the COVID-19 (see, for example Amodio et al., 2022; Goldhaber et al., 2022; Lessler et al., 2021; Vlachos et al., 2021), while others detecting no significant or even positive effects on SARS-CoV-2 cases (see, for example Diederichs et al., 2022; Isphording et al., 2021; von Bismarck-Osten et al., 2022). Therefore, it is unclear whether fewer school closures would have had a negative effect on health outcomes of vulnerable groups in the population such as the elderly. On the other hand, there is growing evidence that school closures negatively affected children's mental and physical health in several ways. Among others, they led to significant increases in mental problems such as depression and anxiety (see, for instance, Banko-Ferran et al., 2023, for an overview), higher levels of domestic violence (e.g., Leslie and Wilson, 2020) and lower reporting of child maltreatment (e.g., Baron et al., 2020). Moreover, several studies showed that the increased childcare and home-schooling responsibilities led to worse mental health among parents of young children, and especially among mothers (Blanden et al., 2021; Cheng et al., 2021; Yamamura and Tsustsui, 2021). This gender gap in mental health among parents is in line with the observed shift in the intra-household division of labor and care work during the pandemic in most OECD countries, which was characterized by women undertaking a disproportionally large share of the extra care activities (Danzer et al., 2021). Overall, our results imply that the negative mental health impacts could have been lower under a more equal gender representation in politics.

With respect to educational outcomes, there is evidence on the large negative effects of the school closures on cognitive skills of children (e.g., Engzell et al., 2021; Jack et al., 2023; Werner and Woessmann, 2023). Learning losses were particularly pronounced in the first phase of school closures and were also unevenly distributed across many demographic and socioeconomic dimensions, with children from families with low social status, single parents or ethnic and racial minorities being more adversely affected by the pandemic (see, among others, Adams-Prassl et al., 2020, 2022; Agostinelli et al., 2022; Brodeur et al., 2021; Croda and Grossbard, 2021; Werner and Woessmann, 2023). Evidence from both structural models (Agostinelli et al., 2022; Fuchs-Schündeln et al., 2022) and projection analyses (Hanushek and Woessmann, 2020; Psacharopoulos et al., 2021) indicate that these learning losses are likely to have long-term consequences. Therefore, lower levels of school closures induced by more gender balanced governments could have reduced these societal costs.

Furthermore, many scholars have focused on the labor market consequences of the COVID-19 crisis with its associated disruptions to school activities, showing that the impacts were highly unequal by gender and socioeconomic groups (e.g., Adams-Prassl et al., 2020; Croda and Grossbard, 2021; Heggeness, 2020; Zamarro and Prados, 2021). For example, while Adams-Prassl et al. (2020) find that less educated workers and women are more likely to lose a job, the works by Couch et al. (2022) and Del Boca et al. (2020) show that working women with young children are those who reduced more their participation in the labor market due to increased childcare responsibilities associated with the closure of schools and who found conciliation between career and family more difficult during the pandemic. The gender differences in the labor market may also be driven by changes in the gender norms which have become less egalitarian during the pandemic and by the so-called child penalty which reduces wages of women and translates into lower opportunity costs of time (e.g., Albanesi and Kim, 2021; Danzer et al., 2021). Thus, a reduction in school shutdowns induced by more gender balanced governments could

have been expected to lead to lower economic losses, especially among working mothers of young children.

Finally, there are a number of recent studies examining the long-term implications of school closures for income inequality and intergenerational mobility. For example, Fuchs-Schündeln (2022) finds that in the US and Germany school closures can lead to a long-term decrease in lifetime earnings especially among children coming from poor households, thereby increasing income inequality and reducing intergenerational mobility. Jang and Yum (2023) estimate intergenerational income effects showing that in the US school closures reduce intergenerational mobility of income. Neidhöfer et al. (2021) analyze the relationship between school closures and intergenerational mobility in 17 Latin American countries. The authors find that school closures may lead to a sizeable decline in intergenerational mobility in education. In light of this evidence, we can thus expect that less school closures induced by more gender balanced governments could have reduced inequality and intergenerational persistence in income and education.

To summarize, our analysis suggests that the negative consequences of school closures on mental health, education, labor market outcomes and intergenerational mobility could have been mitigated to some degree with higher women's representation in national governments, while it remains contentious whether this would also have implied adverse health effects among children or adults through higher infection rates.

5   Conclusion

Were female politicians more reluctant to enforce strict school closures during the COVID-19 pandemic than their male counterparts? To answer this question, we analyze school closures during the first three COVID-19 periods and relate it to the share of women in governments at the onset of the pandemic. For this purpose, we construct a novel dataset for the EU-28 countries that combines data on school closures, women

in government, and several COVID-19 and socio-demographic indicators. Our study contributes to the literature on the effects of female politicians in times of crisis on policy decisions by exploring the role of women's representation in political power on the likelihood of implementing school closures during the COVID-19 pandemic.

We document a strikingly negative and significant relationship between the share of women in political power and the likelihood of school closures in Europe. While our current cross-sectional research design does not allow us to draw any sound causal conclusions, we show that our key result is robust to a large battery of robustness checks, alternative specifications and samples. Furthermore, we provide suggestive evidence on some of the possible mechanisms underlying the relationship between women in national governments and school closures. In particular, we find that our observed pattern is in line with the explanation that female politicians have a higher awareness about the potential costs that school closures imply for families, and in particular for working mothers with young children.

Our findings are informative for policymakers as they uncover a so far unnoticed relationship between female political representation and school closures during the COVID-19 pandemic. This relationship indicates that the negative impact of school closures on children and families probably could have been mitigated to some degree if the share of women in government would have been higher. It remains unclear whether this would have come at the cost of adverse health effects on children and adults through higher infection rates.

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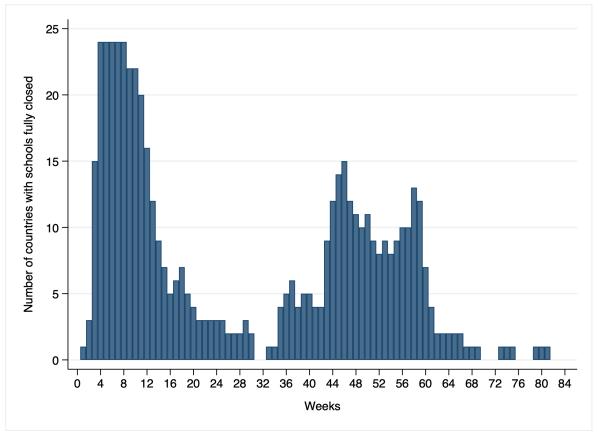
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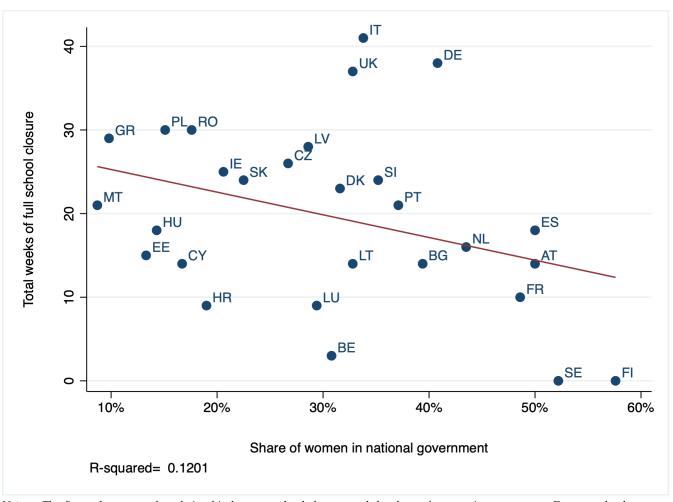
Figures and Tables

Figure 1: Evolution over Time of School Closure in EU-28 Countries – March 1, 2020 to September 30, 2021
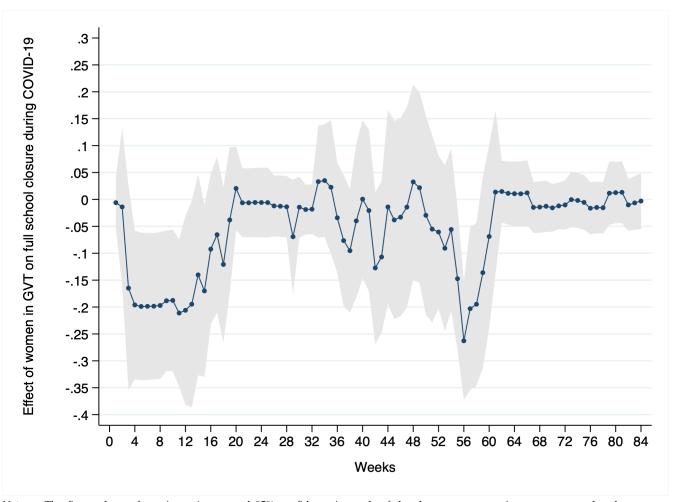

Notes - The figure documents the evolution over time of school closures in our sample of EU-28 countries. The time period is from March 1, 2020 to September 30, 2021. Data on school closures are drawn from the Oxford COVID-19 Government Response Tracker.

Figure 2: School Closures and Women in National Governments by Country – March 1, 2020 to September 30, 2021

Notes - The figure documents the relationship between school closures and the share of women in government. Data on school closure are drawn from the Oxford COVID-19 Government Response Tracker, while information on women's representation in the national government is taken from the Gender Statistics Database of the European Institute for Gender Equality.

Figure 3: Women in Governments and School Closure – March 1, 2020 to September 30, 2021

Notes - The figure shows the point estimates and 95% confidence intervals of the shares on women in governments plus the interaction terms between the share of women in governments and week dummies. Data on school closure are drawn from the Oxford COVID-19 Government Response Tracker, while information on women's representation in the national government is taken from the Gender Statistics Database of the European Institute for Gender Equality.

Table 1: Descriptive Statistics (Observations=2,352 country-weeks)

	Mean	Std. dev.	Min	Max
School closure	0.23	0.42	0.00	1.00
Share of women in government	30.66	13.51	8.70	57.60
Covid-19 cases (per 100,000 people)	16.57	21.46	0.00	148.76
Access to broadband Internet	87.04	6.00	75.00	98.00
Democratic index	7.91	0.85	6.49	9.39
GDP per capita	31,839	19,966	8,820	100,890
Total fertility rate	1.53	0.17	1.14	1.86
Old-age dependency ratio	29.74	3.76	20.70	35.80
Female employment rate	69.79	5.56	56.10	79.70
Expenditure in school education (% of GDP)	2.97	0.61	1.71	4.23
Youth overcrowding	26.30	18.30	3.70	64.10

Notes - Data cover the period from March 1, 2020 to September 30, 2021. Expenditure in school education is defined as the sum of expenditure in primary, lower secondary and upper secondary education (as a % of the GDP). The share of women in government is not standardized.

Table 2: Effects of Women in Governments on School Closure – Main Specification

Dep. var.: School closure	(1)	(2)	(3)	(4)
Women in governments	-0.044**	-0.053***	-0.055***	-0.057***
	(0.020)	(0.018)	(0.018)	(0.019)
COVID-19 cases			0.002	0.003***
			(0.001)	(0.001)
Controls	No	Yes	Yes	Yes
Week FE	No	No	No	Yes
Mean of dep. var.	0.234	0.234	0.234	0.234
Std. dev. of dep. var.	0.424	0.424	0.424	0.424
Observations	2,352	2,352	2,352	2,352

Notes - Standard errors are reported in parentheses and are clustered at the country level. Column 2 controls for the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of population (aged 15-29) living in overcrowded homes. Column 3 also controls for the average of daily COVID-19 cases per 100,000 inhabitants in a week, and column 4 further includes week fixed effects.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table 3: Effects of Women in Governments on School Closure – Heterogeneity and Robustness Checks

	(1)	(2)	(3)	(4)	(5)
	Panel A: Alternative Sample Definitions				
Dep. var.: School closure	No DE, IT and UK	No FI and SE	1st COVID-19 period	2nd COVID-19 period	Excluding July and August
Women in governments	-0.048**	-0.040*	-0.112**	-0.055*	-0.067***
	(0.019)	(0.021)	(0.053)	(0.031)	(0.024)
Mean of dep. var	0.207	0.252	0.508	0.196	0.281
Std. dev. of dep. var	0.405	0.434	0.500	0.397	0.450
Observations	2,100	2,184	532	1,400	1,848
	Panel B: Alternative Specifications				
Dep. var.: School closure	Including gender norms	Including region FE	Country-specific time trends	Including COVID-19 vaccines	Including public sentiment
Women in governments	-0.073**	-0.070***	-0.086**	-0.055***	-0.058***
	(0.034)	(0.017)	(0.041)	(0.019)	(0.017)
Google Trends (covid deaths)					0.002**
					(0.001)
Mean of dep. var	0.234	0.234	0.234	0.234	0.234
Std. dev. of dep. var	0.424	0.424	0.424	0.424	0.424
Observations	2,352	2,352	2,352	2,352	2,352

Notes – Standard errors are reported in parentheses and are clustered at the country level. All models include week fixed effects, and control for the average of daily COVID-19 cases per 100,000 inhabitants in a week, female employment rate, expenditure in school education as a percentage of GDP, access to broadband internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of the population (aged 15-29) living in overcrowded homes.
*Significant at 10 per cent; **Significant at 5 per cent; ***Significant at 1 per cent.

Table 4: Women in Decision-Making Positions and Alternative Definitions of Women in Political Power

	(1)	(2)	(3)	(4)
Panel A: Women in decision-making positions and school closure				
Dep. var.: School closure				
Women in media	-0.021			
	(0.023)			
Women in supreme court		-0.001		
		(0.033)		
Women in research funding			-0.026	
			(0.019)	
Women in business				-0.014
				(0.024)
Mean of dep. var.	0.234	0.234	0.234	0.234
Std. dev. of dep. var.	0.424	0.424	0.424	0.424
Observations	2,352	2,352	2,352	2,352
Panel B: Alternative definitions of women in political power				
Dep. var.: School closure				
Women as national senior ministers	-0.061***			
	(0.021)			
Women in national parliaments		-0.056**		
		(0.026)		
Women in regional parliaments			-0.130**	
			(0.061)	
Women in local administrations				-0.053***
				(0.019)
Mean of dep. var.	0.234	0.234	0.247	0.234
Std. dev. of dep. var.	0.424	0.424	0.431	0.424
Observations	2,352	2,352	1,680	2,352

Notes - Standard errors are reported in parentheses and are clustered at the country level. All models include week fixed effects, and control for the average of daily COVID-19 cases per 100,000 inhabitants in a week, female employment rate, expenditure in school education as a percentage of GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of the population (aged 15-29) living in overcrowded homes.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table 5: Alternative Explanations

Dep. var. School closure	(1) Benchmark	(2) Incl. political orientation	(3) Incl. share of women with children	(4) Incl. gender of educ. minister
Women in governments	-0.057***	-0.055**	-0.057*	-0.057***
	(0.019)	(0.022)	(0.028)	(0.019)
Mean of dep. var.	0.234	0.234	0.234	0.234
Std. dev. of dep. var.	0.424	0.424	0.424	0.424
Observations	2.352	2.352	2.352	2.352

Notes - Standard errors are reported in parentheses and are clustered at the country level. All model specifications include controls for average of daily COVID-19 cases per 100,000 inhabitants in a week, week fixed effects, and the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and the percentage of population (aged 15-29) living in overcrowded homes. Column 1 represents the benchmark results. Column 2 includes controls on political orientation, which is defined in three main categories: left-wing, centre, and right-wing governments. Column 3 controls for the share of women in senior positions with children to all senior members of government. At last, column 4 controls for an indicator variable, which equals 1 if the person in charge of the education ministry is a woman.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table 6: Potential Mechanisms

Dep. var.: School closure	(1)	(2)	(3)

Panel A – High maternal LFP & high childcare enrollment vs. rest

	Low	High	P-value Δ
Women in government	-0.044***	-0.097***	0.006
	(0.014)	(0.010)	

Panel B – By type of government

	Parliamentarian	Presidential	P-value Δ
Women in government	-0.046**	-0.113	0.559
	(0.023)	(0.105)	

Panel C – By closeness to election

	$\leq$ 8 months	> 8 months	P-value Δ
Women in government	-0.114*	-0.052**	0.355
	(0.064)	(0.020)	

Notes - Standard errors are reported in parentheses and are clustered at the country level. All model specifications include controls for average of daily COVID-19 cases per 100,000 inhabitants in a week, week fixed effects, and the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and the percentage of population (aged 15-29) living in overcrowded homes. Columns 1 and 2 represent the heterogeneity analysis of the respective panel, where estimation results are based on fully interacted models. Column 3 reports $Prob > F(\chi^2)$ of difference between the respective coefficients in columns 1 and 2. In panel A, the set of countries with above median maternal labour force participation and above median childcare enrollment rates are categorized under the high group, while all other countries are categorized under the low group. In panel B, countries are divided by their type of government, either parliamentarian or presidential (in some cases also semi-presidential). In Panel C, the two groups of country-week observations are determined by whether or not the respective country has a national election within the next 8 months.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

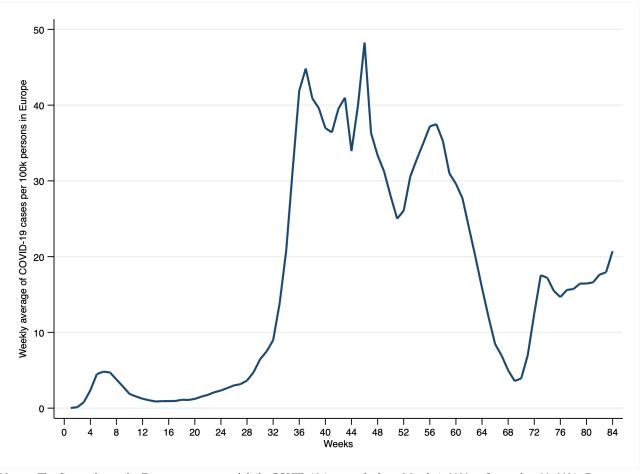Table 7: Women in Governments and Gender-Neutral Containment Measures

Dep. var.:	(1) Face coverings	(2) Restrictions on gatherings	(3) Close public transport	(4) Restrictions on international movement	(5) Stringency index
Women in governments	0.058	0.027	-0.105	0.023	-0.217
	(0.039)	(0.027)	(0.089)	(0.049)	(1.632)
Mean of dep. var.	0.446	0.775	0.434	0.705	56.66
Std. dev. of dep. var.	0.497	0.418	0.496	0.456	17.54
Observations	2,352	2,352	2,352	2,352	2,352

Notes - Standard errors are reported in parentheses and are clustered at the country level. All models include week fixed effects, and control for the average of daily COVID-19 cases per 100,000 inhabitants in a week, female employment rate, expenditure in school education as a percentage of GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of the population (aged 15-29) living in overcrowded homes.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.
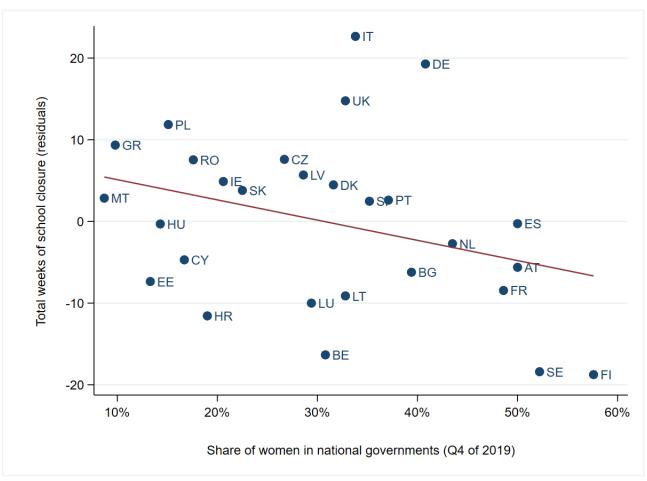
Appendix: Supplemental Figures and Tables

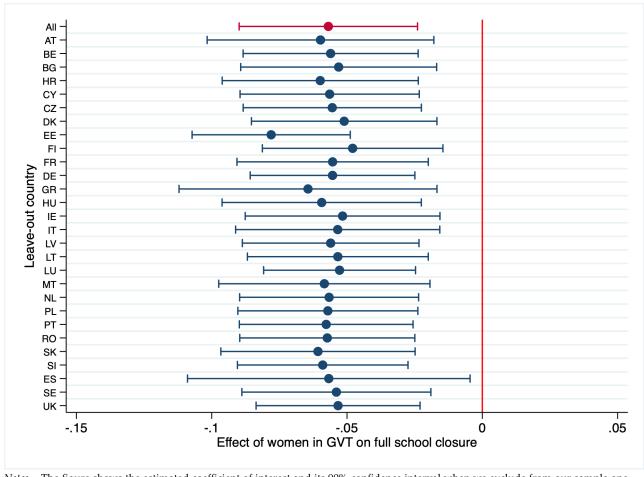Figure A.1: COVID-19 Cases in Europe – March 1, 2020 to September 30, 2021

Notes - The figure shows the European average of daily COVID-19 in a week, from March 1, 2020 to September 30, 2021. Data on COVID-19 policies are drawn from the Oxford COVID-19 Government Response Tracker.

Figure A.2: School Closures and Women in National Governments by Country – March 1, 2020 to September 30, 2021 – Residualized Relationship

Figure A.3: Effects of Women in Governments on School Closure – March 1, 2020 to September 30, 2021 – Excluding One Country at a Time

Notes - The figure shows the estimated coefficient of interest and its 90% confidence interval when we exclude from our sample one country at a time.

Table A.1: Effect of Women in Governments on School Closures – Bootstrapped P-Values

Dep. var.: School closure	(1)	(2)	(3)	(4)
Women in governments	-0.044**	-0.053***	-0.055***	-0.057***
	(0.020)	(0.018)	(0.018)	(0.019)
COVID-19 cases			0.002	0.003***
			(0.001)	(0.001)
Controls	No	Yes	Yes	Yes
Week FE	No	No	No	Yes
Observations	2,352	2,352	2,352	2,352
R-squared	0.011	0.025	0.033	0.369
Bootstrapped p-value	0.076	0.015	0.018	0.024

Notes - Standard errors are reported in parentheses and are clustered at the country level. Column 2 controls for the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of population (aged 15-29) living in overcrowded homes. Column 3 also controls for the average of daily COVID-19 cases per 100,000 inhabitants in a week, and column 4 further includes week fixed effects. The table also reports bootstrapped p-values for the coefficient of women in government.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table A.2: Effects of Women in Governments on School Closure – Alternative Measurements of COVID-19 and Lagged COVID-19 Cases among the Controls

Dep. var.: School closure	(1)	(2)	(3)	(4)
Women in governments	-0.063***	-0.061***	-0.059***	-0.059***
	(0.018)	(0.019)	(0.020)	(0.020)
COVID-19 deaths	0.207**			
	(0.079)			
Excess deaths		0.016***		
		(0.005)		
COVID-19 cases (t-1)			0.004***	
			(0.001)	
COVID-19 cases (t-2)				0.005***
				(0.005)
Mean of dep. var.	0.234	0.234	0.237	0.238
Std. dev. of dep. var.	0.424	0.424	0.425	0.426
Observations	2,352	2,352	2,324	2,296

Notes - Standard errors are reported in parentheses and are clustered at the country level. All models include week fixed effects and control for female employment rate, expenditure in school education as the percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of the population (aged 15-29) living in overcrowded homes.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table A.3: Effects of Women in Government on School Closure – Logit and Probit Analyisis

Dep. var: School closure	(1) OLS	(2) Logit	(3) Probit
Women in governments	-0.057***	-0.063***	-0.065***
	(0.019)	(0.023)	(0.022)
Mean of dep. var.	0.234	0.270	0.270
Std. dev. of dep. var.	0.424	0.444	0.444
Observations	2,352	2,044	2,044

Notes - Standard errors are reported in parentheses and are clustered at the country level. All models include week fixed effects, and control for the average of daily COVID-19 cases per 100,000 inhabitants in a week, female employment rate, expenditure in school education as a percentage of GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and percentage of the population (aged 15-29) living in overcrowded homes. Columns 2 and 3 report the average marginal effects.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table A.4: The Role of Pandemic Severity

	(1)	(2)	(3)

Panel A: Heterogeneity by Pre-Pandemic Indicators

	Low	High	P-value Δ
I. By old-age dependency ratio			
Women in government	-0.092***	-0.084*	0.871
	(0.026)	(0.045)	
II. By healthcare expenditure			
Women in government	-0.108***	-0.133***	0.601
	(0.038)	(0.027)	

Panel B: Heterogeneity by Actual Degree of Pandemic Severity

	Low	High	P-value Δ
I. By COVID-19 cases			
Women in government	-0.063*	-0.046	0.771
	(0.035)	(0.037)	
II. By excess deaths			
Women in government	-0.066***	-0.041	0.463
	(0.021)	(0.029)	
III. By Google COVID deaths searches			
Women in government	-0.053***	-0.062**	0.746
	(0.016)	(0.028)	

Notes - Standard errors are reported in parentheses and are clustered at the country level. All model specifications include controls for average of daily COVID-19 cases per 100,000 inhabitants in a week, week fixed effects, and the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and the percentage of population (aged 15-29) living in overcrowded homes. Columns 1 and 2 represent the heterogeneity analysis of the respective panel, where estimation results are based on fully interacted models. Column 3 reports $Prob > F(\chi^2)$ of difference between the respective coefficients in columns 1 and 2. In Panel A, the two groups high and low divide the full sample of countries by those below and above median of the respective category of pre-pandemic indicators (i.e., old-age dependency ratio and healthcare expenditure). In Panel B, the division by above/below median of the respective pandemic indicator (i.e., COVID-19 cases, excess deaths and Google searches) occurs within a country, meaning that for each country, half of the weekly observations are in the low, and the other half in the high group.

*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table A.5: Robustness to Gender Attitudes Measured by the Share of Women in Other Power Positions

Dep. var.: School closure	(1)	(2)	(3)	(4)	(5)
Women in government	-0.066***	-0.066***	-0.053**	-0.057***	-0.072***
	(0.023)	(0.021)	(0.020)	(0.019)	(0.024)
Women in media	0.015				0.001
	(0.025)				(0.040)
Women in supreme court		0.027			0.033
		(0.034)			(0.040)
Women in research funding			-0.008		0.008
			(0.021)		(0.036)
Women in businesses				-0.015	-0.020
				(0.023)	(0.037)
Mean of dep. var.	0.234	0.234	0.234	0.234	0.234
Std. dev. of dep. var.	0.424	0.424	0.424	0.424	0.424
Observations	2,352	2,352	2,352	2,352	2,352

Notes - Standard errors are reported in parentheses and are clustered at the country level. All model specifications include controls for average of daily COVID-19 cases per 100,000 inhabitants in a week, week fixed effects, and the following set of country-level variables: female employment rate, expenditure in school education as a percentage of the GDP, access to broadband Internet, total fertility rate, democratic index, log of GDP per capita, old-age dependency ratio, and the percentage of population (aged 15-29) living in overcrowded homes.
*Significant at 10 per cent; ** Significant at 5 per cent; ***Significant at 1 per cent.

Table A.6: Variables and Sources for the Data

A: Women in Power:

Variable	Definition	Source
Women in national government	Share of women from total ministers or a secretaries in public office in a national government. In some countries state-secretaries (or the national equivalent) are considered as junior ministers within the government (with no seat in the cabinet) but in other countries they are not considered as members of the government.	European Institute for Gender Equality
Women as senior ministers	Share of women as senior ministers in national government. Senior ministers are members of the government who have a seat in the cabinet or council of ministers (count includes the prime minister).	European Institute for Gender Equality
Women in national parliaments	Share of women from total members of national parliament. The national parliament is the national legislative assembly. In a bicameral system, the parliament consists of two chambers/houses - a lower house and an upper house. In a unicameral system, there is only a single house of parliament.	European Institute for Gender Equality
Women in regional parliaments	National average of the share of women in the assembly of a region (i.e. regional authority) which is composed of popularly elected representatives of constituent self-governing regions. Note that the different terms used in each country - e.g. regional parliament, regional council and regional assembly - are all treated as being equivalent.	European Institute for Gender Equality

Table A.6 – continued from previous page

Variable	Definition	Source
Women in local administrations	National average of the share of women in local councils, i. e. the representative assembly of a municipality, city or town which is taken to be the lowest level of administrative subdivision with self-government and the associated political, administrative, and fiscal powers granted to elected representative bodies. In most countries, this is the municipality.	European Institute for Gender Equality
Women in media	Share of women from total executives in publicly owned broadcasting organisations: TV, radio and news agencies operating at the national level.	European Institute for Gender Equality
Women in supreme court	Share of women as members of the national supreme court of a country.	European Institute for Gender Equality
Women in research funding	National average of the share of women as members of self-governed funding organisations allocating national public funds to research organisations, programmes or projects in the countries covered.	European Institute for Gender Equality
Women in businesses	National average of the share of women in Chief Executive Officer (CEO) or equivalent positions in the largest publicly listed companies in each country.	European Institute for Gender Equality
B: COVID-19 Measurements		
COVID-19 cases	Average of daily COVID-19 cases in a week by 100k persons in a country.	Oxford COVID-19 Response Tracker
COVID-19 deaths	Average of daily COVID-19 deaths in a week by 100k persons in a country.	Oxford COVID-19 Response Tracker

Table A.6 – continued from previous page

Variable	Definition	Source	
Excess deaths	Excess mortality is measured as the difference between the reported number of deaths in a given week or month (depending on the country) in 2020–2022 and an estimate of the expected deaths for that period had the COVID-19 pandemic not occurred.	Our World in Data	
COVID-19 vaccine doses	Weekly sum of vaccine doses against COVID-19 administered by 100k persons in a country.	Oxford Tracker	COVID-19 Response
	C: Non-Pharmaceutical COVID-19 policies		
School closed	Binary variable, = 1 if the country has school in person fully closed during the week because of the COVID-19 pandemic.	Oxford Tracker	COVID-19 Response
Face covering	Binary variable, = 1 if the country has policies for face covering in all public spaces, or always in presence of other people.	Oxford Tracker	COVID-19 Response
Restrictions on gathering	Binary variable, = 1 if the country has policies implemented to restrict gatherings of either groups above 100 or 10 persons.	Oxford Tracker	COVID-19 Response
Close public transport	Binary variable, = 1 if the country has policies strongly restricting or completely cancelling public transportation.	Oxford Tracker	COVID-19 Response
Restricted international movement	Binary variable, = 1 if the country has policies strongly restricting or completely cancelling international travel.	Oxford Tracker	COVID-19 Response

Table A.6 – continued from previous page

Variable	Definition	Source	
Stringency index	The nine metrics used to calculate the Stringency Index are: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls. The index on any given day is calculated as the mean score of the nine metrics, each taking a value between 0 and 100.	Oxford COVID-19 Response Tracker	
	D: Other Variables		
Access to broadband internet	Percentage of households in a country with access to broadband internet, which is defined as having a capacity higher than ISDN, meaning equal to or higher than 144 kbit/s.	Eurostat (table: ISOC_CI_IT_H)	
Democratic index	The index is based on 60 indicators grouped in five categories, measuring pluralism, civil liberties and political culture.	The Economist (EIU), 2019	
GDP per capita	The indicator is calculated as the ratio of real GDP to the average population of a specific year. GDP measures the value of total final output of goods and services produced by an economy within a certain period of time.	Eurostat (table: TPS00198)	
Total fertility rate	The total fertility rate is defined as the mean number of children who would be born to a woman during her lifetime, if she were to spend her child-bearing years conforming to the age-specific fertility rates, that have been measured in a given year.	Eurostat (table: DEMO_FIND)	

Table A.6 – continued from previous page

Variable	Definition	Source
Old-age dependency ratio	This indicator is the ratio between the number of persons aged 65 and over (age when they are generally economically inactive) and the number of persons aged between 15 and 64. The value is expressed per 100 persons of working age (15-64).	Eurostat (table: TPS00198)
Female employment rate	Percentage of women (age class: 15 - 64) who, during the reference week performed work, even for just one hour a week, for pay, profit or family gain or who were not at work but had a job or business from which they were temporarily absent because of something like, illness, holiday, industrial dispute or education and training.	Eurostat (table: LFSI_EMP_A)
Expenditure in education	Expenditure in primary, lower-, and upper-secondary education as percentage of GDP.	Eurostat (table: EDUC_UOE)
Youth overcrowding	A person is considered as living in an overcrowded household if the household does not have at its disposal a minimum of rooms equal to: - one room for the household; - one room by couple in the household; - one room for each single person aged 18 and more; - one room by pair of single people of the same sex between 15 and 29 years of age; - one room for each single person between 15 and 29 years of age and not included in the previous category. For youth (ages 15-29).	Eurostat (table: ILC_LVHO05A)
Gender equality index	The Gender Equality Index consists of six core domains (work, money, knowledge, time, power and health). The Index measures gender gaps that are adjusted to levels of achievement, ensuring that gender gaps cannot be regarded positively where they point to an adverse situation for both women and men. It assigns scores for Member States, between 1, total inequality and 100, full equality.	European Institute for Gender Equality

Table A.6 – continued from previous page

Variable	Definition	Source
Gender norms	National average of the responses to the following two statements (in a 1-to-4 scale, from agree strongly, to disagree strongly): (1) When a mother works for pay, the children suffer; (2) When jobs are scarce, men have more right to a job than women.	European Values Study (2017)
Regions	Division of countries in the following cross-country regions: Northern Europe (SE, FI, DK, EE, LV, LT), West-Central Europe (AT, BE, LU, UK, IE, NL, FR, DE), East-Central Europe (PL, CZ, SK, HU, RO, BG), and Southern Europe (GR, IT, ES, MT, PT, SI, HR, CY).	United Nations geoscheme for Europe (United Nations, 2016)
Political party	Categorization of the political direction of the party (or parties) in government during 2019 into left, center, or right.	Data collected by authors
Google trends (COVID deaths)	Index (0–100) of weekly searches of the term "covid deaths" in Google.	Google Trends
Expenditure in health-care	Expenditure in health-care as percentage of GDP in 2019 (2018 for the UK).	Eurostat

(table: HLTH_SHA11_HC) |