An Investigation into the Proportion of Women in National Parliament in a Cross-Country Sample

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In national parliaments worldwide, under-representation of women has been a persistent problem. In this rigorous econometric analysis, Debbie Blair seeks to explain the proportion of women in a national parliament, using a wide variety of socio-economic, political and cultural variables. The study draws some interesting conclusions for policy makers looking to address this gender imbalance.

Introduction

> 'In politics, if you want anything said ask a man, if you want anything done ask a woman.'

The above quote can be attributed to Margaret Thatcher, British politician and Prime Minister from 1979 to 1990. December 2011 saw the release of The Iron Lady, a film which portrayed her influential role in politics. Since the start of the 20th century there have been immense social changes in women's rights and roles, with the aim of achieving equality of the sexes. however,, despite the plethora of advances that have been made women still remain underrepresented in national parliaments. Worldwide, women constitute only 19.9% of parliaments, despite composing of just over 50% of the population. This paper intends to examine the factors that may be responsible for determining the proportion of women in parliament. It will focus on three main variable groupings namely socio-economic, political and cultural factors. This research aims to shed light on their respective contributions, in order to inform policies as to how to equalise political representation and thus create a more equitable society.

Background

Although women constitute just over half the population, there is a significantly smaller percentage of women in national parliaments. This topic has received much attention in the literature, with researchers attempting to explain both the existance of this discrepancy and cross country variation. Past research has prominently focused on the socio-economic and institutional factors that may impact the engagement of women in parliament. however,, recent papers have highlighted the importance of cultural factors that act as barriers to female involvement (Ruedin, 2010).

Often, socio-economic factors are suggested as contributing factors that affect the supply of qualified women. Educational attainment, labour force participation and GDP per capita are the prime candidates for influence. Previous research has found mixed results for the role of education in predicting parliamentary participation (Rule, 1987). A woman may achieve high levels of education but be reluctant to pursue a role in public life, such as in parliament. Higher female labour force participation rates have been more commonly associated with higher participation in parliament (Rule, 1987). It is also likely that GDP per capita may play a role; countries with higher levels of per capita income typically more equitable societies.

The type of electoral system and the use of quotas are frequently cited as explanatory factors. Electoral systems are typically broken down into four major subtypes; Proportional Representation (PR), Majority Representation (MR), Mixed and Other. PR systems are generally associated with a higher proportion of women in parliament (Tripp & Kang, 2008). This is likely to be due to representative nature of the PR system. Gender quotas are an area of much debate and controversy. Many of their opponents believe that positive discrimination is itself inequitable and may prevent the election of highly qualified candidates, who just happen to be male. Despite this and other criticisms, a number of countries have adopted various forms of gender quota. It remains to be shown whether one type of quota is more effective than the other. however,, studies report that quotas are associated with higher female representation (Wangnerud, 2009).

Nevertheless, models which focus solely on the above categories lack explanatory power. It seems that there are substantial cultural barriers which hinder female participation. Cultural variables are hard to measure, and research typically uses proxy variables such as region and religion (Inglehart Norris, 2003) to capture the effects of cultural and attitudinal differences. Recent work by Reudin (2010) found that more direct measures of attitudes towards women held higher predictive power. However, there remain diffi-

culties in obtaining reliable direct measures and those that are available are limited to a small number of countries.

This research attempts to account for the proportion of women in parliament, as predicted by the factors that have been proposed in the literature. It hypothesises that a combination of socio-economic, political and cultural factors is likely to best explain the variation. It builds on prior research by attempting to identify if one grouping of variables makes an overarching contribution. The researcher tentatively suggests that cultural variables are likely to hold substantial explanatory power. Despite recent advancements in socio-economic status of women and the acknowledgment of the importance of representative political structures, there has not been a worldwide increase in number of women in parliament; this suggests that significant cultural and psychological barriers may be responsible for low representation.

Early research focused primarily on OECD countries but modern research includes worldwide statistics. This research focuses on a worldwide sample of countries at one point in time. While it may be useful to see the trends across time, this research has been restricted to cross-sectional data in order to avoid confounds such as years since suffrage, changes in electoral systems, and adoption of gender quotas at different times.

Empirical Approach

This study uses Ordinary Least Squares estimation in order to investigate the determinants of the proportion of women in national parliament as of 2009 in a cross-sectional sample of countries. The model will estimate equation 3.1.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon \quad (3.1)$$

Dependent Variable

Y (Proportion of Women in Parliament) : The dependent variable of interest is the proportion of women in national parliament as of 2009.

Independent Variables

Socio-economic Variables

X_1 (gdppc): The first explanatory variable is the level of Gross Domestic Product per capita in thousands of dollars, adjusted for purchasing power using 2005 as the base year. It is hypothesised that this will have a positive effect on the proportion of women in parliament.

X_2 (Lffm) : The second independent variable is the female labour force participation rate. This represents the proportion of women aged 15 and older that is active in the labour force. It is hypothesised to have a positive effect.
X_3 (Total3ed) : This third explanatory variable refers to the percentage of the total population of the same age bracket participating in third level education. This variable serves as a benchmark for the education level of the total population. It is hypothesised to be positively related to the dependent variable.
X_4 (Fem3ed) : This variable represents the proportion of the gross female population that is enrolled in third level education. It is expected to have a positive impact on involvement in parliament.
X_5 (FemPop): This independent variable is the last of the five socio-economic variables included in this analysis. It represents the percentage of the population that is female. It is expected to have a slight positive effect on participation rates.

Political Variables
X_6 (quota) : This is a dummy variable indicating the presence of a gender quota. A value of one was assigned if a gender quota was present in the electoral process and a value of zero was assigned if there was no quota. It is hypothesised that presence of a gender quota would have a positive effect on the dependent variable. The coefficient on this dummy is denoted α_1.
X_7 (electsys) :This variable refers to the type of electoral system, being classified into one of four subtypes (MR, PR, Mixed or Other). In the regression model analysed, three dummies were included for this variable in order to capture the individual effect of each electoral system. It is believed that using the PR system will have a positive effect on the proportion of women in a national parliament. The coefficients are denoted as follows: δ_1 (MR), δ_2(PR), δ_3(Mixed) and δ_4 (Other) .

Cultural Variables
X_8(religion) : This is a dummy variable indicating the predominant religion in the country. It was subdivided into three classifications; Catholic, Muslim and Other. It is believed that both
Catholic and Muslim will have a negative impact on proportion of women in parliament. The coefficients on these are denoted γ_1 (Catholic), γ_2 (Muslim) and γ_3 (Misc) respectively.
X_9 (region) : This final explanatory variable consists of a number of dummy variables intending to capture the attitudes of people from particular regions. It is hypothesised that a country's being Nordic is likely to have a positive effect; a country's being Middle Eastern is expected to have a negative effect.

There were no further hypotheses concerning the other regions. The coefficients on each region are denoted as follows: ϕ_1 (AsiaPac), ϕ_2 (LatAmCar), ϕ_3 (Western), ϕ_4 (EastEur), ϕ_5 (Nordic), ϕ_6 (Africa) and ϕ_7 (Mide).

Error Term

ε (error term): The error term is believed to capture the unobservable factors that could not be controlled for, such as family history in politics and direct attitudes to women as politicians and any other variables. The error term is assumed to have zero mean, constant variance and to follow a normal distribution.

The full model, thus, is shown in regression equation 3.2.

$$\begin{aligned} Y = {} & \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \\ & + \alpha_1 X_6 \\ & + \delta_1 X_{71} + \delta_2 X_{71} + \delta_3 X_{71} \\ & + \gamma_1 X_{81} + \gamma_2 X_{82} \\ & + \phi_1 X_{91} + \phi_2 X_{92} + \phi_4 X_{94} + \phi_5 X_{95} + \phi_6 X_{96} + \phi_7 X_{97} \\ & + \varepsilon \end{aligned} \tag{3.2}$$

Data

The majority of data was sourced from the World Bank (2009). Recent data were available for all variables of interest for 2009 and this year was chosen for analysis. Data on the type of electoral system in each country were downloaded from the Inter-Parliamentary Union (2009) and a list of countries with gender quotas was obtained from the Global Database of Quotas for Women (2009). Religion statistics were acquired from the CIA World Factbook (2009). Each country was classiffied into one of three categories, depending on its predominant religion.

Only Muslim- and Catholic-dominated countries were considered independently, as it has been consistently shown that the preponderance of these religions influences the proportion of women in parliament. All other countries were grouped together as miscellaneous (miscrel). While this may mask other influential patterns from other faiths, this step was taken in order to preserve the degrees of freedom of the model. Countries were divided into regions according to United Nations Statistics Division country classifications. These are: Nordic (Nord), Western Europe and North America (Western), Eastern European (EastEur), Latin America and the Caribbean (LatAmCar), Middle

Eastern countries (Mideast), African countries (Africa) and countries in Asia and the Pacific (AsiaPc).

The initial sample consisted of 216 countries. However, countries that were missing values on 4 or more of the explanatory variables were excluded. The final sample consisted of 180 countries.

Each variable was given a specific label that will be referred to throughout this paper. These are shown in Table 4.1.

Table 4.1 Variable Labels

Summary statistics for the numerical variables were generated; the mean, standard deviation and the ranges, where appropriate, are displayed in Table 4.2.

Variable Name	Label
Proportion of Women in Parliament	Parliament
GDP per capita PPP (constant 2005 international $)	gdppc
Labour participation rate, female (% of female population ages 15+)	lffm
School enrolment, tertiary (% gross)	Total3ed
School enrolment, tertiary, female (% gross)	Fem3ed
Population, female (% of total)	fmpop
Presence of Gender Quota	Quota
Type of Electoral System	Electsyst
Predominant Religion	Religion
Region	Region

Table 4.2: Descriptive Statistics

Measure	Parliament(%)	Gdppc (000s $)	Lffm (%)	Total3ed (%)
Mean	17.3767	11916.5	2.8871	40.62
Standard Deviation	10.9395	13088.8	14.7864	27.6799
Range	[0,56.3]	[298.297,73196.383]	[13.8, 91]	n/a

Measure	Fem3ed (%)	Fmpop(%)
Mean	45.67	49.986
Standard Deviation	32.90	3.02

Range	n/a	[24.96686, 54.0225]

Each nominal variable contained a number of classifications. The count of each subgroup is shown in Tables 4.3, 4.4, 4.5 and 4.6.

Table 4.3: Quota

	Count
Yes	103
No	78

Table 4.4: Type of Electoral System

	Count
MR	71
PR	68
Mixed	34
Other	8

Table 4.5: Religion

	Count
Catholic	48
Muslim	44
Misc	89

Table 4.6: Region

	Count
AsiaPac	34
LatAmCar	31
Western	22
EastEur	21
Nord	5
Africa	52
Mideast	14

Results

Diagnostic Checks

In order to determine the appropriate method of estimation, some diagnostic checks were performed. The main concern was that the data would exhibit heteroscedasticity, which would violate the assumptions of OLS. Scatterplots of the residuals revealed no obvious patterns and both the Breusch-Pagan and the White test (for heteroscedasticity) were insignificant for all of the regressions. Each regression was also tested for misspecification of the data using, the Ramsey RESET Test. This test was insignificant for all but regression one which involved only socio-economic variables. Multi-collinearity was assessed using the Variance Inflation Factor (VIF). Whilst there were somewhat high VIF values for the education variables, the mean VIF was still a reasonably low value. It was concluded that the Gauss-Markov assumptions were upheld. Thus OLS was considered appropriate and was applied in all of the analysis that follows.

Model

A number of models were analysed, in order to distinguish between the effects of various groupings of factors. The estimated coefficients, standard errors (in parentheses) and significance are shown in table 5.1.

The first regression model included only the socio-economic variables. In this model, GDP per capita, female labour force participation rate and percentage of population that are female were all significant at the 1% level. However, the practical effect of GDP is small, as the coefficient is negligible. In comparison, it would seem that an increase of 1% in the labour force participation rate leads to a .24% increase in the proportion of women in parliament. This is in line with previous literature (Rudein, 2010, Rule, 1987). An increase of 1% in the proportion of women in the population leads to an increase of 1.45% in parliament. However, the practical importance of this finding is questionable, as there is not much scope to increase the proportion of women in the population beyond its present level.

The second model included only political factors. Here, the presence of gender quota was significant at the 1% level. Having a quota increased the proportion of women in parliament by 6.2%. There was no affect found for any of the different types of electoral systems, contrary to the expectation that having proportional representation would positively influence the numbers of women in parliament.

The third regression model included only the factors being used as proxies for cultural factors. The Muslim variable was significant at the 10%

level (p=0.075). This indicated that, compared to the 'other religions' group, having a Muslim-dominated country led to a decrease of 3.77 percentage points in the proportion of women in parliament. The regional variables gave rise to three significant effects. The Nordic countries compared to Western countries had a strong significant positive effect (p=0.000). Nordic countries had a 21.07% increase in the proportion of women in parliament. In comparison, AsiaPac had a significant negative effect (p= 0.037) when compared to Western. Similarly, Middle Eastern countries had a negative effect at the 10% level (p=.099).

Table 5.1: Regression Results

Variable	1	2	3	4
Cons_	-72.976 (24.987)	10.742 (3.819)	20.726 (2.259)	-22.311 (32.760)
GDPpc	.000 *** (.000)			.000 (.000)
Lffm	.259*** (.077)			.257*** (.093)
Total 3ed	-.007 (.209)			.029 (.221)
Fem3ed	-.033 (.170)			-.059 (.182)
FMpop	1.454 ***			.655 (.626)
QuotaY		6.202 *** (1.632)		5.058*** (1.937)
Electmixed		2.332 (4.227)		-3.086 (4.975)
Electmr		.327 (1.988)		-2.924 (2.415)
Electpr		2.106 (1.349)		-.230 (1.567)
Muslim			-3.774* (2.108)	-.720 (2.916)
Catholic			1.574 (1.995)	-1.382 (2.478)
AsiaPac			-5.9822** (2.822)	-6.375 (4.818)
Nord			21.075*** (4.938)	14.008*** (4.992)

LatAmCar			-3.079 (2.731)	-8.362* (4.337)
EastEur			-3.021 (2.948)	-5.92 (3.889)
Africa			-3.190 (2.643)	-9.489* (4.984)
Mide			-6.464 (3.902)	-7.021 (5.678)
Observations	99	180	180	99
Adjusted R2	.2476	.1596	.2944	.4136

*** P<.01, **P<.05, * P<.1

However, all of the first three models had relatively low explanatory power. Each model does not control for the other possible factors that are likely to influence the proportion of women in parliament. This leads to biased estimates and violations of the assumptions of OLS. Thus, a model including all the proposed explanatory variables was run. This model was then tested with a number of restrictions, in order to delineate whether any one grouping had an overarching influence on proportion of women or whether it is best predicted by an amalgamation of different influences.

This model confirmed expectations that having a gender quota present increased the proportion of women in parliament. A significant positive effect was found (p=.011) in which having a quota resulted in a 5.058% increase. This is in line with prior findings. It makes sense logically that gender quotas in the political environment are likely to lead to increased numbers of women in parliament, when compared to having no such quota. Labour force participation rate was, notably, the only socio-economic factor found to have a significant effect on parliament participation rates (p=.007). An increase of l% led to a .257% increase. This suggests that the more women that are engaged in working world the more likely they are to be represented in parliament. This is in line with prior findings. However, it could be argued that an environment that promotes active participation in the labour force also encourages participation in parliament, i.e. both variables could be explained by a third factor, not a direct causal link between the two.

Contrary to expectations and past research, there were no significant effects found for the religious variables. It may be that they are a poor proxy of the attitudes of a country. Alternatively, the broad classifications of Catholic, Muslim and other, used in this model, left out important differences. Out of the regional dummy variables there were three significant effects. In line with

the hypothesis it seemed that a country's being Nordic had a positive effect on the proportion of women in parliament. Interestingly both Latin American Caribbean countries and African countries displayed negative significant effects on proportion of women in parliament, although significance was only found at the 10% level. It is worth noting that the regional variables were being compared to the Western classification of countries. This was chosen as the benchmark group for a number of reasons, namely that it is this region that has typically endorsed women's rights and that the countries within the region are generally perceived as relatively democratic.

The Adjusted R-Squared in this model was .4136. This suggests that 41.36% of the variation in the proportion of women in parliament is explained by the model. The p-value of the F-test of overall significance was less than .01 which supports the overall significance of the model. Tests of multiple restrictions indicated that each grouping of variables adds significant explanatory power to the model, which justifies their inclusion in the final model.

It seems that a variety of factors contributes to explaining the proportion of women in parliament. Policy makers should focus on a variety of mechanisms in order to increase the numbers of women in parliament. Certainly some of the factors found to be significant in this model are modifiable. The implementation of gender quotas and policies that aim at increasing female labour force participation rates may be useful mechanisms of change.

Limitations and Extensions

This research is not without its limitations, some of which have been alluded to throughout this paper.

Firstly, the appropriateness of religion and region variables as proxy variables for attitudes is questionable. It is postulated that a direct measure of attitudes would have significantly more explanatory power. Rudein (2010) found that using direct measures of attitudes from the world value survey had significantly larger effects and his model had higher explanatory power. However, the sample size of countries with direct measures is small at present and more research is needed in order to broaden the spectrum of countries covered. Attitudes are difficult to measure and certainly the development of a satisfactory scale would be a significant advancement for many fields. There is no such tool available now and research is limited by using proxy variables that may or may not reflect the cultural values towards women in parliament.

Secondly, the variable of quota indicated the presence of a quota at some stage in the political system. However, there are many different forms of quota in place around the world, including reserved seats, legal candidate

quotas and political party quotas. Future research should consider whether one type of quota is more effective at increasing the number of women in parliament.

Thirdly, there are explanatory variables, which have not been included in this analysis, which are likely to be included in the error term. These may be biasing the results. One likely candidate is a family history of involvement in politics, which has been shown to influence involvement in politics by both genders. The length of time since women were given voting rights in a country may also have an impact. Certainly there are likely to be different effects, depending on the length of time since they were allowed to vote. In some circumstances, this would result in fewer women involved as it is against the norm and there is a lack of role models. In other circumstances, a newly acquired voice may be valued more highly and encourage more women to engage in politics. The omission of these and other variables could be addressed in future research.

Finally, this analysis looked at a cross-country sample at one point in time. It would be interesting to use panel data in order to track longitudinally the evolution of the rates of female involvement in parliament across countries.

Conclusion

This research has demonstrated that the proportion of women in parliament can be predicted using OLS estimation. It seems that a model involving a mix of socio-economic, political and cultural factors holds the most explanatory power. Certainly, there is no simple relationship between any one variable or set of variables and the proportion of women in parliament. However, this should not deter policymakers, researchers and the public from endeavouring to increase participation rates. On Forbes' List of World's Most Powerful People 2011, Angela Merkel was the only woman to feature in the top 10. It is hoped that recognition of the causal influences of under-representation in parliament will allow barriers to be broken down, and could lead to more equal proportion of the men and women, not only in parliaments, but in all of the worlds forums.

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