

# Econ642 Development Economic Term Paper

## Does Women Care More?

The relationship between women's participation in  
law-making and national health expenditure

Zhiyuan Jiang

April 24, 2022

# Abstract

This paper is trying to investigate the relationship between a country's budget size in the healthcare sector and the ratio of women in the country's legislature. Using panel data from 122 countries across 20 years and a fixed-effect model, we found in middle-lower income countries and countries with a deficient democracy system, an increasing proportion of female lawmakers in the parliament is positively correlated with the country's healthcare expenditure. In other types of countries, this relationship is not significant. This paper also discussed such relationships in different scenarios, such as in countries with different healthcare systems or considering the gender of the country's leader, and the relationship is insignificant. The rationale behind such results, we believe, is because only in certain types of countries, here refer to countries with middle-lower income levels or a deficient democratic system, female politicians could have space to exert their influence.

# Contents

1	Introduction	4
2	Data and Methodology	6
2.1	Dependent Variable: health care expenditure to total national budget . . . . .	6
2.2	Independent Variable: ratio of females lawmakers to the total numbers of lawmakers.	7
2.3	Control Variables . . . . .	7
2.4	Extra Variables: Binary and Intersection . . . . .	8
2.5	Sample Size, Time Period, and Grouping . . . . .	9
2.6	Model . . . . .	10
3	Empirical Findings	11
3.1	Global Overview . . . . .	11
3.2	Grouping Discussion . . . . .	12
3.2.1	Rich Countries versus Poor Countries . . . . .	12
3.2.2	Public versus Private . . . . .	14
3.3	Rubber Stamp or Power House: The Influence of Democratic Level . . . . .	16
3.3.1	Quasi Difference-in-Difference . . . . .	16
3.3.2	Results of Democracy Level Study . . . . .	16
3.4	Budget Maker or Budget Approver: The Influence from Administration Branch . .	18
4	Conclusion and Limitation	20
4.1	Conclusion . . . . .	20
4.2	Limitation and Potential Extension . . . . .	21
	References	23

## List of Tables

1	Regression results of models measuring the relationship between country's health care expenditure to the total national budget and the ratio of female lawmakers in the country's parliament. . . . .	11
2	Regression results after breaking the country into HighIncome, Upper-Middle Income, Lower-Middle Income, Low Income groups based on the country's GNI per capita. . . . .	13
3	Regression results after breaking the country's healthcare system into public-dominant and private-dominant based on the proportion of public and private healthcare expenditure to the total healthcare expenditure . . . . .	15
4	Regression results after considering the country's democracy level. . . . .	17
5	Regression results after taking the gender of the country leader into the model. Countries are break into small group based on the national income level (measured by GNI per capita) . . . . .	19
6	The summary statistics of variables for all 122 countries . . . . .	25

Women belong in all places where decisions are being made

-Ruth Bader Ginsburg

## 1 Introduction

In 2015, United Nations (UN) presented a new framework aiming to improve the sustainable development of the world, naming it as "Sustainable Development Goals" (SDGs). This framework includes 17 bulletins, and the fifth goal is "achieve gender equality and empower all women and girls". This high priority of gender equality indicates the importance of this issue with regard to the general development of human welfare.

In fact, the relationship between economic development and the empowerment of women had been long discussed by various scholars. Duflo (2012) documented a series of papers researching the relationship between women's empowerment and economic development. In general, the research agrees on a positive relationship between women's empowerment and economic development, and the relationship goes in both ways. Narrowing the gender difference relies on the development of the social-economic conditions of a country, and such improvement will benefit the country's long-term economic development. Especially in some specific field, like nutrition and education, the rising status of females will bring a great boost to the country's economy. For example, Duflo admitted that although with limitations, women's empowerment can lead to improvements in children's health.

One potential mechanism that enables such improvement is budget allocation. Women can influence the item being purchased by the household, and therefore influence the welfare. This conclusion, from the micro-level, had been supported by numerous researchers. Hoddinott and Haddad (1995) studied the data from Cote d'Ivoire and found that women tend to spend household income on family-friendly items such as nutrition rather than alcohol or cigarette. And such spending increase has a positive influence on children's nutrition condition. Similarly, Quisumbing and Maluccio (2003) argues that in some countries the increase in a household's female members' assets will lead to an increase in expenditure on children's education. The evidence above arguably proved that at least at the household level, females tend to be better budget makers than males on the issues of health and education.

The study about women's influence does not stop at the household level, but the presentation

of women in other fields has also been proved to have a positive influence. In the middle and lower levels of government management, such as state legislation (Irma, 2011) or village council (Chattopadhyay & Duflo, 2004), women leaders tend to have different preferences for public goods allocation and infrastructure investment plans. Those preferences include more investment in projects related to nutrition, entry-level education, and policies that guaranteed the equally inherent right of males and females, etc.

With the hierarchy going up, scholars had observed more evidence to support the argument that women's participation in national-level governing might bring benefits. Dollar, Fisman, and Gatti (2001) provided evidence to show that the involvement of female officers in government can reduce the overall corruption level of the administrative body. But this result had been questioned by other scholars (such as Sung, 2003) since this effect can be caused by a better democratic system that encourages more women's participation and dampens the corruption, rather than the other way around. Taking this measurement into account, however, later research still finds the benefits of involving women in country-level decision-making. Especially in the legislative body where lawmakers are responsible for making laws and designing budgets. Jayasuriya and Burke (2013) collected data from over 100 countries and concludes that the country with a higher participation rate of women in the law-making process tends to have a higher economic growth rate in general. As a subjective indicator, York and Bell (2014) presented the result that people tend to have a higher life-satisfaction rate if their national parliament or house of deputies has a higher ratio of female members. The influence of female lawmakers also extends to other more specific fields. For example, Salahodjaev and Jarilkapova (2020) showed an "S" shape relationship between a country's deforestation level and the proportion of women members in the legislative body. The deforestation will decrease as the number of female lawmakers increases. Such decreasing will meet some bottlenecks, but the deforestation rate will keep moving down once the ratio breaks a certain threshold.

With all the research presented above, the relationship between women's participation in the parliament and the national health expenditure has rarely been discussed. Current studies more focusing on the general budget allocation plan or the administrative branch. Funk and Philips (2018) analyzed data from over 5000 Brazil municipalities and found that female mayors and legislative representatives tend to spend more budget on feminine issues, like health care and education, and less on masculine issues such as transportation. Although the distinction between feminine issues

and masculine issues is vague and subjective, this finding is aligned with the similar studies in India (Irma, 2011). To the country level legislation body, Chen (2010) found same result as Funk and Philips, and Irma. By studying the female seat quota, Chen argues every one percentage point increase of female seats on the lawmaking body, the ratio of government expenditure on health and social welfare to GDP will shift up 0.18 and 0.67 percentage points. Focusing on the health expenditure itself, Mavisakalyan (2014) studied the government and the cabinet and concludes that increasing the share of women in the administration may increase the government's spending on the health care system.

This paper tries to study the specific relationship between the legislature and health care. Precisely speaking, this paper will investigate the relationship between the proportion of seats held by women lawmakers and the national health care expenditure. The rest of the paper will be organized as follow. Section 2 will introduce the data been used in this research and discuss the model been employed. Section 3 will present the analytical result, and interpret the coefficient and relationship between variables. The last section 4 will discuss the conclusion from this study and also raise some limitations about the methods been used.

## 2 Data and Methodology

### 2.1 Dependent Variable: health care expenditure to total national budget

This paper will use the percentage of a country's health care expenditure to the country's total national expenditure as the measurement of a country's health care expenditure. This variable is calculated by multiplying the health care expenditure per total Gross Domestic Production (GDP) with the inverse of total expenditure per total GDP. The GDP uses the U.S. dollar in the observed year as unit. A higher value of this variable simply represents the country allocates more budget to the health care sector. Using the ratio between health care expenditure and total expenditure rather than the health care expenditure per GDP avoid the problem that rich country may have a higher GDP base and hence may have a lower health expenditure proportion even if they spend a similar amount of budget on health care than other less developed countries.

The data series is collected from World Health Organization (WHO)<sup>1</sup>

## 2.2 Independent Variable: ratio of females lawmakers to the total numbers of lawmakers.

The main variable of interest in this study is the ratio of female lawmakers to the total number of lawmakers, and we collect this data from the World Bank.<sup>2</sup> This variable represents the level of women's participation in a country's budget-making and policymaking. The higher value of this variable means that the corresponding country will have a larger number of women involved in the national level parliament. Notice that here the parliament is referred to as both the lower house of the Bicameral System, such as the House of Representatives in the U.S, the House of Common in British, or the House of Deputies in some countries like Rwanda, or the lawmaking body in a Unicameralism system.

## 2.3 Control Variables

Suggested by the common practice and literature in the health economic research (see Gerdtham & Jönsson, 2000 and Hitiris & Posnett, 1992), the data set will contain some control variables to restrict the behaviors of the dependent variable. Literature usually suggests that the level of a country's health care expenditure will be determined by three aspects. The first is the development level. Wealthy countries tend to have more budget for health care than developing countries or less developed countries. Therefore, the data set used in this research contains GDP per capita (U.S. dollar) to capture the development level. Demographic had been proved to have a huge influence on the expenditure of the health care system. Countries facing aging problems like Japan or Italy tend to allocate more budget to support the medical and other support systems. But it is worth noticing that countries with a high ratio of aging population are usually also wealthy countries. Here this research will use the proportion of people aged above 64 as an indicator of the aging society. Another control variable that connects with demographic is the proportion of youth in the population. The proportion of the population aged less than 15 had been used for such measurement.

---

<sup>1</sup>See: <https://apps.who.int/nha/database/Select/Indicators/en>

<sup>2</sup>See: <https://data.worldbank.org/indicator/SG.GEN.PARL.ZS?view=chart>



The last variable that has been suggested by the literature that could be used to explain the health care expenditure is the level of prevalence of contagious diseases. Countries with pandemics tend to spend more budget on public health to curb the disease. In this study, Tuberculosis (TB) is the selected disease and we use the number of incidents of TB per 100,000 people as the indicator.<sup>3</sup>

Other than the four variables introduced above, this study also included several extra control variables. Considering developing countries, especially countries in Africa rely heavily on foreign aid to help establish the health care system, an extra variable that measured the Official Development Assistance (ODA) is added into the model to capture relevant influence. This ODA variable measures the amount of aid (unit in U.S dollar) a country received or paybacked during one calendar year. Inspired by Sung (2003) and Jayasuriya and Burke (2013), this model will contain the female labor participation level variable into the model. This variable helps eliminate the influence of a better system. In other words, a country with more females participating in the labor market or has more female lawmakers may indicate the country is more modern since it encourages the participation of women workers, and therefore more likely to provide a better health system. By including the labor participation labor, we could largely eliminate such influence. Finally, the democracy index variable will be used to test the different influences of legislative bodies in democratic countries and non-democratic countries. By including this variable, the model will reveal the influence of the presentation of women, even when the law-making body is just a rubber stamp.

The primary source of the data is the World Bank Open Data<sup>4</sup>. And the measurement of democracy level comes from the Democracy Matrix.<sup>5</sup> The summary statistic is presented in Table 6 in the Appendix.

## 2.4 Extra Variables: Binary and Intersection

To further investigate the influence of women's participation in the legislature, extra binary variables are considered.

The first binary variable represents the level of that country's women's participation in the legislature. For every year, we calculate the average percentage of seats that have been held by female lawmakers from our sample. If a country in a specific year has a ratio higher than that year's world

---

<sup>3</sup>For the reason of selecting TB, please read Silva, Arinaminpathy, Atun, Goosby, and Reid (2021).

<sup>4</sup>visit: <https://data.worldbank.org/>

<sup>5</sup>This project is hosted by the University of Wurzburg. Source: <https://www.democracymatrix.com/download>

average, we will give that country at that year the dummy variable value 1. Otherwise, the variable will have a value of 0.

The second variable relates to the democratic level. The data set we used in this research to measure the democratic level, the Democracy Matrix, provides a category of the different regimes. Based on the rank and score, the Democracy Matrix divided all countries into five groups: Working Democracy, Deficient Democracy, Hybrid Regime, Moderate Autocracy, and Hard Autocracy. For the construction of the democracy binary, we give every country labeled as either Working Democracy or Deficient Democracy a value of 1, and countries belonging to the other three groups will have a value of 0. We then multiply these two binary variables to obtain the intersection term. Only the country that has been democratic and has a ratio of female lawmakers higher than the world average can have an intersection term value equal to 1. All other countries will have the intersection variable equal to 0.

The last binary variable represents the gender of the head of state or head of government. For every country and every year, we documented the gender of the country's leader. If the leader is female, this gender variable will have a value of 1, otherwise being 0.

## 2.5 Sample Size, Time Period, and Grouping

A collection of panel data which contains 122 countries across 20 years (2000 - 2019) will be used in this study. The observations are made annually, so each country will have 20 observations. The data set covered the major economies and countries at different development levels. The choice of the time frame is restricted by the availability of data. From the original data, countries with missing data more than 3 observations for any single variable series are dropped. The rest missing data value is replaced by the average value of other observed data.

Considering the heterogeneous nature of countries, the whole data sample is further broken down into smaller groups for the convenience of analysis. Based on the criteria provided by the World Bank<sup>6</sup>, every country was categorized as either a High-Income country, Upper-middle Income country, Lower-middle Income country, or Low-Income country, base on the country's Gross Net Income (GNI) per capita of the year and the World Bank criteria of that year. Notice, due to

---

<sup>6</sup>see:<https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022> for latest criteria

the changing landscape of both global economic, and country-level economics, the category of income level for a country will change dynamically. That says a country that has been labeled as an Upper-middle Income country may drop to a Lower-middle Income country in the next year.

Due to the differences in the health care system, the role government plays in providing health care varies across countries. In countries like Costa Rica or some Welfare states, the public sector is responsible for most of the health care services. But in some countries where the state power is weak, health care is bolstered primarily by the private provider. Therefore, we labeled countries with more than half of health care expenditure coming from the private sector as private-dominant countries, and the rest are categorized as public-dominant countries.

## 2.6 Model

The main goal of this study is to investigate the relationship between the health care expenditure and the number of seats held by females in the national parliament. The baseline model that has been used in this study is a panel data fixed-effect model:

$$Health_{i,t} = \beta_1 Lawmaker_{i,t-1} + \lambda \mathbf{X}_{i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

The under script  $i$  indicates the country, and  $t$  indicates the year of observation. The left-hand side variable  $Health_{i,t}$  is the health care expenditure variable for country  $i$  at year  $t$ .  $Lawmaker$  is the proportion of seats held by female lawmakers, and because the parliament usually decides on the next year's national budget, variables in the model had been lagging. The under script for the lawmaker variable has a time indicator as  $t - 1$ . Notice that due to this reason, the data been applied to this model will only have 19 observations for every country, hence the  $t$  will have values from 2001 to 2019.  $\beta_1$  is the corresponding coefficient of the lawmaker variable.

Matrix  $\mathbf{X}_{i,t}$  denotes all control variables described in the previous section, and  $\lambda$  denotes the corresponding coefficient of each variable. The exact variables inside  $\mathbf{X}_{i,t}$  are dependent on the setting of the model. For the fixed effect model,  $\alpha_i$  and  $\gamma_t$  represent the country and the time intercepts. The last term  $\varepsilon_{i,t}$  is the error term.

### 3 Empirical Findings

#### 3.1 Global Overview

We first examine the effect of the female lawmaker ratio in parliament on the country's health care expenditure from a global perspective.

	(1)	(2)	(3)	(4)
Female Lawmaker(%)	0.087*** (0.003)	0.008 (0.009)	0.096*** (0.004)	0.006 (0.009)
GDP per capita (US\$)	0.00003*** (0.000)	0.00004*** (0.0000)	0.00003*** (0.000)	0.00003*** (0.0000)
Population 64+ (%)	0.146*** (0.01)	0.317*** (0.041)	0.172*** (0.011)	0.271*** (0.044)
Population 0-14 (%)	-0.086*** (0.013)	-0.275*** (0.032)	-0.062*** (0.013)	-0.261*** (0.032)
TB cases	-0.001*** (0.0002)	0.002*** (0.0006)	-0.001*** (0.0002)	0.002*** (0.0006)
Labor Participation Rate (%)			-0.028*** (0.0034)	0.067*** (0.015)
Fixed Effect: Year	YES	YES	YES	YES
Fixed Effect: Country	NO	YES	NO	YES
Observations:	2318	2318	2318	2318
Adjust $R^2$	0.339	0.892	0.346	0.893

Note: Notation \*\*\*,\*\*,\*,# denotes a significant level of 0.0001, 0.001, 0.05, and 0.1 respectively.

Table 1: Regression results of models measuring the relationship between country's health care expenditure to the total national budget and the ratio of female lawmakers in the country's parliament.

For Table (1), the odd number columns represent the fixed effect model only controle the year, and the even-number columns contain both years fixed effect and country fixed effect. The latter two columns contain the labor participation rate to adjust the influence of a better system. The female lawmaker ratio has a positive sign in all four models, without regard to the labor ratio participation rate.

However, the significant influence of the female lawmaker ratio is erased after adding the country-level fixed effect into the model.

All other variables, including economy development measurement (GDP per capita) the demography indicators (aged population and youth population, and the measurement of the contagious disease (TB cases) that are suggested by the Hitiris and Posnett (1992) and Gerdtham and Jönsson

(2000), and the labor participation rate variables are consistently significant across all scenarios. Other than the youth population variable, all other variables have a positive sign. This is aligned with the conventional belief about their relationship with the health care expenditure.

Contradict with the previous research results, one possible explanation for the non-significant coefficient of the female lawmaker variables is that other variables are the deterministic factors for the expenditure of health care. Therefore, the variables suggested by both Hitiris and Posnett (1992) and Gerdtham and Jönsson (2000) will overpower the lawmaker ratio, causing the non-significant coefficient.

## 3.2 Grouping Discussion

Noticing the different results before and after introducing the country-level fixed effect variable, it is reasonable to assume that the country's heterogeneity would influence the regression results. Hence, the countries are categorized into different subgroups for further analysis based on different criteria.

### 3.2.1 Rich Countries versus Poor Countries

We conduct the regression analysis for different income-level groups, and the results are presented in table (2).

After breaking down the data set into subsamples, we could still observe a non-significant coefficient of lawmaker ratio variables in high-income, upper-middle-income, and low-income countries. However, the lawmaker variables present a positive, significant coefficient for the lower-middle-income countries. This indicates that in the lower-middle-income countries, the increasing representation of females in the legislature positively influences the allocation of the national budget to the health care system.

One possible explanation for why this relationship only appears in the lower-middle-income countries is that, for those countries, after resolving the problem of mass and extreme poverty which most of the low-income countries are still suffering, those lower-middle-income countries are trying to establish a modern system of society, which including the health care system. The presentation of women in the legislature will influence the decision-making process of establishing the healthcare

	(1) High	(2) Upper-Middle	(3) Lower-Middle	(4) Low
Lawmaker Ratio (%)	-0.0006 (0.01)	-0.0041 (0.029)	0.04*** (0.008)	0.01 (0.03)
GDP per capita (US\$)	0.00003*** (0.000)	-0.00007 (0.00005)	0.0002 (0.0001)	-0.0012 (0.0008)
Population 64+ (%)	0.435*** (0.06)	-0.292* (0.123)	-0.008 (0.126)	-3.1*** (0.652)
Population 0-14 (%)	-0.063* (0.027)	-0.234* (0.084)	-0.256*** (0.056)	-0.209*** (0.151)
TB Cases	0.013\$ (0.011)	0.004*** (0.0008)	-0.0013*** (0.0014)	-0.003*** (0.002)
Labor Participation Rate (%)	0.04* (0.016)	0.013 (0.035)	0.048 (0.034)	0.115# (0.057)
Foreign Aid (US\$)			-0.011*** (0.002)	0.006# (0.003)
Fixed Effect: Year	YES	YES	YES	YES
Fixed Effect: Country	YES	YES	YES	YES
Observations:	874	1064	1140	665
Adjust $R^2$	0.915	0.903	0.878	0.475

Note: Notation \*\*\*,\*\*,\*,# denotes a significant level of 0.0001, 0.001, 0.05, and 0.1 respectively.

Table 2: Regression results after breaking the country into HighIncome, Upper-Middle Income, Lower-Middle Income, Low Income groups based on the country's GNI per capita.

system by influencing the national budget. For high-income and upper-middle-income countries, with a well-established health care system, the space left to the lawmakers to infuse their influence is limited. This is reflected in the non-significant coefficient results of the lawmaker variable.

For the low-income countries, it is worth noticing that some of the variables like the GDP per capita and the aging population behave unexpectedly. The adjusted  $R^2$  for the low-income countries model is also significantly lower than its counterparts, even with both the year fixed effect variables and country fixed effect variables. That might indicate severe omitted variables biased in the low-income countries model.

### 3.2.2 Public versus Private

Generally, a country's health care expenditure came from two sources: the public sector and the private sector. How a country constructs its healthcare system will largely influence how the country decides the national healthcare budget. For instance, Costa Rica provides universal public health-care coverage to all residents of the country, and more than 30% of the country's total budget is allocated to the health sector. It is reasonable to assume that country with a strong private health-care provider system may rely less on government funding for providing healthcare, and hence plan less budget for the sector. Therefore, in this section, we isolate countries with private dominant healthcare systems from public dominate countries. We presume that the female lawmakers in a country with a private-dominant system will not influence the healthcare budget significantly, since healthcare might not be the priority of the government's agenda.

From the regression results in Table (3), we could observe that compared with private-dominant countries, the gender of lawmakers has a strong influence on the country's budget allocation result. While the coefficient is only significant on a 10% significant level, it is consistent with the assumption. All other variables' coefficients have the expected sign.

The low significant level of the lawmaker variable could be explained by the "overpower" theory we provided in the previous section. The dominant variables, namely GDP per capita, demographic pattern, and the TB cases, all have coefficients at a high significant level. These variables provide a majority part of the explaining power and hence provide limited space for the lawmaker to influence the issue.

	(1) Public-Dominant	(2) Private-Dominant
Female Lawmaker (%)	0.0167 <sup>#</sup> (0.009)	0.005 (0.015)
GDP per capita (US\$)	0.000019 <sup>**</sup> (0.000)	0.00007 <sup>***</sup> (0.0000)
Population 64+ (%)	0.371 <sup>***</sup> (0.06)	0.243 <sup>*</sup> (0.089)
Population 0-14 (%)	-0.15 <sup>***</sup> (0.027)	-0.25 <sup>**</sup> (0.08)
TB Cases	0.002 <sup>***</sup> (0.0004)	0.0005 (0.0013)
Labor Participation Rate (%)	0.03 <sup>*</sup> (0.013)	0.15 <sup>***</sup> (0.021)
Fixed Effect: Year	YES	YES
Fixed Effect: Country	YES	YES
Observations:	1570	748
Adjust $R^2$	0.895	0.838

Note: Notation \*\*\*,\*\*,\*,# denotes a significant level of 0.0001, 0.001, 0.05, and 0.1 respectively.

Table 3: Regression results after breaking the country's healthcare system into public-dominant and private-dominant based on the proportion of public and private healthcare expenditure to the total healthcare expenditure



### 3.3 Rubber Stamp or Power House: The Influence of Democratic Level

The influence of the legislature varies dramatically across countries. In a well-developed democratic system, parliament's members as elected officials have a direct influence on the country's development agenda. In contrast, the legislatures in autocracy regimes are called a "rubber stamp" since they can not play the role of balance and check but approve bills or make laws based on the will of the country's leading power.

In this section, we take political freedom into the consideration when measuring the relationship between lawmakers' gender and the national healthcare budget. The baseline assumption for this study is even in autocracy countries where the parliament has limited power and influence, the presentation of female members shall still have an influence on the decision-making, compared to countries with fewer female members.

#### 3.3.1 Quasi Difference-in-Difference

For purpose of this case study, we augmented the model (1) introduced in section 2.6 by adding binary variables described in the section 2.4.

$$\begin{aligned} Health_{i,t} = & \beta_1 Lawmaker_{i,t-1} + \lambda \mathbf{X}_{i,t} + \beta_2 B_{i,t}^{Demo} + \beta_3 B_{i,t-1}^{Lawmaker} + \\ & \beta_4 (B_{i,t}^{Demo} \times B_{i,t-1}^{Lawmaker}) + \alpha_i + \gamma_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

We refer this model as quasi difference-in-difference model. The idea of this model is directly borrowed from the difference in difference model. Here,  $B_{i,t}^{Demo}$  and  $B_{i,t-1}^{Lawmaker}$  denotes two binary variables of democracy level and lawmaker ratio above or below average respectively. We also includes the interaction term of these two binary variables into the model. Only when a country has both been classified as a democracy, and have female lawmaker proportion higher than average the three variables will be presented in the model simultaneously.

#### 3.3.2 Results of Democracy Level Study

From the regression results, we found no significant evidence to prove that the democracy level, work together with the female lawmaker ratio, will influence the healthcare expenditure.

	(1) All Countries	(2) All Countries	(3) Working Democracy	(4) Deficient Democracy	(5) Hybrid Regime	(6) Moderate Autocracy	(7) Hard Autocracy
Female Lawmaker (%)	0.0096 (0.0106)		-0.0109 (0.013)	0.023 (0.014)	0.011 (0.0216)	-0.01 (0.024)	0.029 (0.02)
GDP per capita (US\$)	0.000035*** (0.000)	0.00003*** (0.0000)	-0.000013 (0.0000)	0.0001** (0.0000)	0.00003# (0.0000)	0.0001** (0.000)	-0.00006# (0.000)
Population 64+ (%)	0.271*** (0.04)	0.266*** (0.04)	0.447*** (0.072)	-0.068 (0.098)	0.751*** (0.135)	0.306# (0.161)	-0.055 (0.2)
Population 0-14 (%)	-0.261*** (0.031)	-0.262*** (0.03)	-0.056 (0.076)	-0.345*** (0.053)	-0.059 (0.075)	-0.378*** (0.083)	-0.327** (0.095)
TB Case	0.0029*** (0.0006)	0.003*** (0.000)	-0.0013 (0.0016)	0.0035* (0.001)	0.013** (0.004)	0.012*** (0.001)	-0.0003 (0.005)
Labor Participation (%)	0.065*** (0.015)	0.066*** (0.014)	0.116*** (0.027)	0.026 (0.024)	0.118** (0.027)	0.256*** (0.044)	-0.197*** (0.031)
Lawmaker Binary	-0.15 (0.14)	-0.089 (0.126)					
Democracy Binary	-0.145 (0.141)	-0.156 (0.143)					
Interaction	-0.025 (0.198)	-0.032 (0.199)					
Democracy Index			-7.223 (5.519)	6.953*** (1.268)	-4.331 (2.87)	6.579 (4.842)	-1.553 (4.222)
Fixed Effect: Year	YES	YES	YES	YES	YES	YES	YES
Fixed Effect: Country	YES	YES	YES	YES	YES	YES	YES
Observations:	2318	2318	754	678	377	245	121
Adjust $R^2$	0.893	0.893	0.916	0.831	0.867	0.834	0.922

Note: Notation \*\*\*,\*\*,\*,# denotes a significant level of 0.0001, 0.001, 0.05, and 0.1 respectively.

Table 4: Regression results after considering the country's democracy level.

From Table (4), all three binary variables are insignificant at every significance level, indicating the lawmakers' gender may make no influence on the country's healthcare budget. That says, even in democratic countries where the legislature is one of the most powerful institutes, gender has limited influence on healthcare expenditure.

For further analysis, we categorized the countries into five subgroups based on the criteria provided by the data source. The regression suggested that only in deficient democracy, where the country presents all democracy characteristics but some of the characteristics are underdeveloped, the level of democracy will have a strong and positive influence on the country's healthcare budget. The rationale behind this we presume is similar to the result we observed in the previous sector where countries categorized as middle-lower income's healthcare expenditure will be significantly influenced by the number of female lawmakers. In deficient democracy, the development of the system relies on the opinions of different classes and interest-group, and this provides the opportunity for females to exert their influence, and hence reflects on the regression as a significant coefficient.

### 3.4 Budget Maker or Budget Approver: The Influence from Administration Branch

In most of the country, the legislative branch of the government is in charge of auditing and approving the country's budget. The real budget maker is the administrative branch of the government. Take Australia, a parliamentary system country, as an example. The government (usually the Treasury takes the lead) and the cabinet are in charge of making the annual federal budget, and after a series of reviews, the final budget plan will be sent to the Parliament for approval.

Therefore the influence of the government should also be taken into consideration when discussing the national budget. In this case study, we employ a quasi-DID approach from the previous sector (3.3). New variable measures the gender of the country's head of state or head of government, and its intersection term with the lawmaker binary variable are added to the model.

Based on the previous study (see Funk & Philips, 2018, Irma, 2011, and Mavisakalyan, 2014), it is reasonable to assume those female leaders lean to allocate the national budget to health care, education, and social welfare.

However, the results from regression do not follow previous studies. The results suggest a no-significant relationship between the leader's gender, the lawmaker's gender, and the health care expenditures.

	(1) All Countries	(2) High	(3) Upper-Middle	(4) Lower-Middle	(5) Low
Female Lawmaker (%)	0.0129 (0.011)	0.018 (0.011)	-0.0006 (0.02)	0.065*** (0.011)	0.006 (0.021)
GDP per capita (US\$)	0.000035*** (0.000)	0.00003*** (0.0000)	-0.00004 (0.0000)	0.0004 (0.0002)	-0.0015# (0.0008)
Population 64+ (%)	0.267*** (0.04)	0.448*** (0.057)	-0.281* (0.133)	0.327 (0.345)	-2.775*** (0.522)
Population 0-14 (%)	-0.262*** (0.031)	-0.035 (0.03)	-0.223* (0.079)	-0.288*** (0.071)	-0.228# (0.115)
TB Case	0.0029*** (0.0006)	0.011 (0.011)	0.004*** (0.0008)	-0.002 (0.001)	-0.001 (0.002)
Labor Participation Rate (%)	0.066*** (0.015)	0.033* (0.014)	0.028 (0.038)	0.034 (0.025)	0.094* (0.04)
Foreign Aid (US\$)				-0.009** (0.002)	0.007# (0.003)
Lawmaker Binary	-0.2 (0.119)	-0.692* (0.302)	-0.29 (0.228)	-0.638* (0.242)	0.33 (0.481)
Leader Gender	0.185 (0.192)	0.352 (0.276)	0.112 (0.266)	-1.685* (0.763)	-0.151 (0.477)
Interaction	0.005 (0.239)	-0.379 (0.370)	-0.291 (0.685)	0.472 (1.09)	-0.136 (1.32)
Fixed Effect: Year	YES	YES	YES	YES	YES
Fixed Effect: Country	YES	YES	YES	YES	YES
Observations:	2318	739	641	678	378
Adjust $R^2$	0.893	0.914	0.902	0.831	0.465

Note: Notation \*\*\*,\*\*,\*,# denotes a significant level of 0.0001, 0.001, 0.05, and 0.1 respectively.

Table 5: Regression results after taking the gender of the country leader into the model. Countries are break into small group based on the national income level (measured by GNI per capita)

There are several explanations for this result. The study made by Mavisakalyan (2014) includes not only the head of state/government but also the gender of the cabinet members to describe the gender features of the administrative branch. Alongside the gender of the head of state/government, Mavisakalyan also includes extra control variables of the country's leader like the race, age, number of offspring, and their genders, etc. Therefore a lack of control may contribute to the difference in conclusion.

Irma (2011) in his study of India suggested that even though the female indeed makes different decisions than male, such differences will gradually disappear with the political hierarchy arise. That says women in a high-level political arena such as national congress or central government may make an indifferent decision than man does. Hence, the gender of the country's leader may be less significant to the issues of health care expenditure.

## 4 Conclusion and Limitation

### 4.1 Conclusion

With this study, we cast doubt on some previous research about female and their influence on the country-level economic development. We found no obvious evidence to suggest female politicians, especially the lawmakers of the legislature, has a positive influence on a country's budget allocation of healthcare. This result is consistent across most development levels, democracy levels, and healthcare systems. However, we did find a relatively weak but strongly significant positive effect of female lawmakers in Lower-middle income countries'<sup>7</sup> healthcare expenditure. We also analyze the results for countries with different democratic levels. The evidence proves that only in countries where the democratic system is under development, the influence of female lawmakers is significant.

In conclusion, the influence of female lawmakers is limited in most countries. Even the past research suggests a policy preference, the females can rarely determine the share of healthcare expenditure of a country. However, in countries where still under development both economically and politically, women can still play a crucial role in the issue of healthcare.

---

<sup>7</sup>countries with GNI per capita between 750 U.S dollars to 4000 U.S. dollars

When discussing the influence of the democracy level and the leader's gender, we created a difference-in-difference (DID) like method to evaluate the impact. The DID method relies on several assumptions and a specific experimental-like setting which may not meet the scenario this research faces. Therefore, the results from the corresponding section may need a more careful interpretation and consideration.

## 4.2 Limitation and Potential Extension

As the study continues, many limitations that restrict this paper's development appear.

The first problem is the sample size. After balancing the quality and quantity of the data, the timeframe of the data set had been restricted by 20 years. However, the influence of women's empowerment, especially from a high-level perspective, might need a longer time period to be reflected in the reality, hence a data set with more observations will be beneficial for this project.

The selection of the control variables could be improved in different ways. Various controls should be considered for testing the robustness of the result. For instance, the female labor participation rate as control of the "better system of better gender" argument can be replaced by the female completion rate of secondary education or other variables. The measurement of the democracy level in this study is inevitably biased since the evaluation of political freedom is subjective. Hence, different variables could be considered for the democracy variable. In the case study of the budget maker and budget approver, only the gender of the country leader had been considered. To have a better understanding of the issue, more variables that sketch the administrative branch shall be employed (for example, the method used by Mavisakalyan, 2014).

By studying other papers, we also found the selection of measurement might significantly influence the results of the paper. For instance, Chen (2010) used the number of available hospital beds as a measurement of healthcare quality when studying the influence of introducing a gender quota to the national parliament. That says the measurement of this study might not be a fair measurement of the country's real health care expenditure, and hence could be adjusted by using other measurements.

Endogeneity is hard to avoid in this study. Especially considering the dynamic at the democratic level, the wealth level of a country, and the opportunity for females to participate in high-level politics. Although some approaches had been used to address the endogenous problem like the

inclusion of control variables, other methods are also worth consideration. For example, using Instrumental Variables to replace some endogenous variables may provide a better regression result and a better understanding of the problem.

In the section 3.2, we mentioned that the Low-Income countries group might suffer omitted variables biased, and they should be given a different set of explanatory variables for analysis. That says the current result for that group of countries might be biased and unreliable, and hence need a careful interpretation.

With regard to the above limitations, we also provide some suggestions about the future extension of this project.

The first is to expand the dataset. As discussed in the limitation, influence from the changing political landscape may need a longer timeframe to examine. Therefore, future researchers could consider either including earlier data points or collecting the latest data to re-do the model.

As suggested by Gerdtham and Jönsson (2000) and Hitiris and Posnett (1992), the health care expenditure is dominated by several factors, and hence only left limited space for other factors. It does not mean that female lawmaker is insignificant to the country's budget allocation. By focusing on other issues like the education expenditure or the social welfare project, we could obtain a more holistic understanding of the relationship between women's empowerment and the country's development.

We also suggested isolating the low-income countries from other countries. Regression results suggest different behaviors between low-income countries and countries from other income levels. The current model may fail to capture the idiosyncratic characteristics of the low-income countries, and we suggest re-formulized models for this specific group.

## References

- Chattopadhyay, R., & Duflo, E. (2004, 9). Women as policy makers: Evidence from a randomized policy experiment in india. *Econometrica*, 72, 1409-1443. doi: 10.1111/J.1468-0262.2004.00539.X
- Chen, L.-J. (2010). Do gender quotas influence women's representation and policies? *European Journal of Comparative Economics*, 7, 13-60. Retrieved from <https://EconPapers.repec.org/RePEc:liu:liucej:v:7:y:2010:i:1:p:13-60>
- Dollar, D., Fisman, R., & Gatti, R. (2001, 12). Are women really the "fairer" sex? corruption and women in government. *Journal of Economic Behavior and Organization*, 46, 423-429. doi: 10.1016/S0167-2681(01)00169-X
- Duflo, E. (2012, 12). Women empowerment and economic development. *Journal of Economic Literature*, 50, 1051-79. doi: 10.1257/JEL.50.4.1051
- Funk, K. D., & Philips, A. Q. (2018, 5). Representative budgeting: Women mayors and the composition of spending in local governments:. *Political Research Quarterly*, 72, 19-33. Retrieved from <https://journals.sagepub.com/doi/full/10.1177/1065912918775237> doi: 10.1177/1065912918775237
- Gerdtham, U. G., & Jönsson, B. (2000, 1). International comparisons of health expenditure: Theory, data and econometric analysis. *Handbook of Health Economics*, 1, 11-53. doi: 10.1016/S1574-0064(00)80160-2
- Hitiris, T., & Posnett, J. (1992, 8). The determinants and effects of health expenditure in developed countries. *Journal of Health Economics*, 11, 173-181. doi: 10.1016/0167-6296(92)90033-W
- Hoddinott, J., & Haddad, L. (1995, 2). Does female income share influence expenditures? evidence from côte d'ivoire. *Oxford Bulletin of Economics and Statistics*, 57, 77-96. Retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1468-0084.1995.tb00028.x> doi: 10.1111/J.1468-0084.1995.TB00028.X
- Irma, C.-F. (2011, 8). Women in politics. evidence from the indian states. *Journal of Public Economics*, 95, 664-690. doi: 10.1016/J.JPUBECO.2010.11.017
- Jayasuriya, D. S., & Burke, P. J. (2013). Female parliamentarians and economic growth: Evidence from a large panel. *Applied Economics Letters*, 20, 304-307. doi:



10.1080/13504851.2012.697113

- Mavisakalyan, A. (2014). Women in cabinet and public health spending: Evidence across countries. *Economics of Governance*, 15, 281-304. doi: 10.1007/S10101-014-0141-X
- Quisumbing, A. R., & Maluccio, J. A. (2003, 7). Resources at marriage and intra-household allocation: Evidence from bangladesh, ethiopia, indonesia, and south africa\*. *Oxford Bulletin of Economics and Statistics*, 65, 283-327. Retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1111/1468-0084.t01-1-00052>  
doi: 10.1111/1468-0084.T01-1-00052
- Salahodjaev, R., & Jarilkapova, D. (2020, 6). Women in parliament and deforestation: cross-country evidence. *Journal for Nature Conservation*, 55, 125830. doi: 10.1016/J.JNC.2020.125830
- Silva, S., Arinaminpathy, N., Atun, R., Goosby, E., & Reid, M. (2021, 10). Economic impact of tuberculosis mortality in 120 countries and the cost of not achieving the sustainable development goals tuberculosis targets: a full-income analysis. *The Lancet Global Health*, 9, e1372-e1379.
- Sung, H. E. (2003). Fairer sex or fairer system? gender and corruption revisited. *Social Forces*, 82, 703-723. Retrieved from <https://www.jstor.org/stable/3598207>
- York, R., & Bell, S. E. (2014, 11). Life satisfaction across nations: The effects of women's political status and public priorities. *Social Science Research*, 48, 48-61. doi: 10.1016/J.SSRESEARCH.2014.05.004

## Appendix

	mean	Std. deviation	min	max
Female Lawmaker (%)	19.66	11.64	0.00	63.75
Health Expenditure (% Total Expenditure)	10.41	4.65	0.63	33.10
GDP per capita (US\$)	13401.4	18987.59	111.9	123514.2
Female Labor Participation (%)	51.14	14.59	12.4	87.81
Official Development Assistance per capita (US\$)	38.26	60.31	-49.54	688.09
Population 64+ (%)	8.72	5.85	0.69	28.00
Population 0-14 (%)	28.05	10.68	12.21	50.07
Incident of Tuberculosis (per 100,000 people)	131.7	201.31	0.00	1270.00
Democracy index	0.67	0.25	0.05	0.98
Lawmaker Dummy	0.44	0.49	0.00	1.00
Democracy Dummy	0.74	0.43	0.00	1.00
Intersection Term	0.34	0.47	0.00	1.00
Leader Gender	0.07	0.25	0.00	1.00

Note: The negative value of Official Development Assistance is caused by the pay back of loan.

Table 6: The summary statistics of variables for all 122 countries