A Study of Domestic Factors Affecting the Tampon Tax Rate

Yoonjung Choi

Hong Kong International School, 1 Red Hill Road, Tai Tam, Hong Kong; yoonjungg.choi@gmail.com

ABSTRACT: This paper investigates the factors influencing the tampon tax rate using cross-sectional data from 193 countries in 2021. From simple linear and logistic regression models, this study finds that higher press freedom, gender equality, and female representation in legislation are positively associated with lower tampon tax rates than the standard VAT rate in the sample countries. Among those three factors, press freedom is the most critical, albeit modest, factor in the multivariate linear and logistic regression models. These findings suggest a possible direction of the social movement to overcome period poverty, especially for journalists and politicians, and the possible means to push governments towards lowering or even eliminating the tampon tax.

KEYWORDS: Behavioral and Social Sciences; Economics and Public Policy; Period Poverty, Tampon Tax; Press Freedom.

Introduction

The average woman menstruates for an average of 38 years and disposes of up to 200 to 300 pounds of pads during her lifetime. Period poverty describes the struggle low-income women and girls face while trying to afford menstrual products. Period poverty is an issue not only in developing countries but also in developed countries. In the US, for example, nearly two-thirds of women in a survey could not afford needed menstrual hygiene supplies.¹ Period poverty has become an even more visible subject, with the pandemic amplifying the vulnerability of many.² Period poverty is an important human rights issue because affordable access to menstrual hygiene products is linked to rights to health, sanitation, education, and work, among other rights stated in the Universal Declaration of Human Rights (UDHR) adopted by the UN General Assembly in 1948.³

The term “tampon tax” refers to the value-added or retail sales tax imposed on menstrual hygiene products. Activists and scholars have encouraged lawmakers to eliminate the tampon tax as menstrual hygiene products are unavoidable necessities.⁴ On 12 July 2021, the Resolution adopted by the U.N.’s Human Rights Council called “Menstrual hygiene management, human rights, and gender equality” emphasized the need for countries to ensure improved access to menstrual products by taking measures, including the elimination or reduction of the tampon tax.⁵,⁶ With the rise of social movements, many countries have repealed the tampon tax by classifying period products as necessities. In contrast, other countries still tax hygiene products as non-essential luxury items.⁷ For example, the UK, whose standard VAT rate was 20%, completely abolished the tampon tax in 2021, while other European countries, such as Finland and Denmark, still impose the standard VAT rate on sanitary products at 24% and 25%, respectively.

Considering the growth of the tampon tax repeal movement worldwide, it is worth taking a step back to consider why some countries react to such demand while others do not. Previous literature has examined the impact of period poverty on human rights, such as girls’ health and education, based on case studies and suggested actions that can be taken to end period poverty.⁸ However, the factors in determining tampon tax policy have received little attention from scholars. Therefore, this study investigates which factors play an essential role in determining and explaining differences in tampon tax rates across countries.

Among potential factors that may affect the tampon tax policy, this study focuses on domestic factors by quantitatively analyzing the data of 193 countries as of 2021. This paper examines the relationship between the tampon tax rate (as the dependent variable) and the potential factors such as press freedom, gender equality, and female representation in congress (as the independent variables). After running empirical models on the datasets, results show that all three independent variables have an impact on a government’s tampon tax policy: An increase in press freedom, gender equality, and female representation in congress is associated with a lower tampon tax rate, and among three variables, press freedom is the most significant. The results of this study suggest a possible direction not only to policymakers but also to the public in considering tampon taxes reduction or elimination.

Methods

This research focuses on press freedom, gender equality, and female representation in congress to test their effects on tampon tax policy in 193 countries.

Data

Selection Criteria:

For this research, I collected the data for 2021 from the public website, as seen in Table 1. Then, I manually matched the different country names across the data. For example, some data sources used the country name “United States of America,” while others used the word “USA” or “United States” to represent the same country. I adjusted these discrepancies and matched the names to complete the cross-sectional data. Table 1 summarizes the data collected for my analysis.
Tables were collected for the research.

<table>
<thead>
<tr>
<th>Name</th>
<th>Unit</th>
<th>Number of Countries</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard VAT Rate(^1)</td>
<td>Decimal</td>
<td>193</td>
<td>PeriodTax.org, Wikipedia</td>
</tr>
<tr>
<td>Tampon Tax Rate(^1)</td>
<td>Decimal</td>
<td>193</td>
<td>PeriodTax.org, Wikipedia</td>
</tr>
<tr>
<td>Female Representation in Congress</td>
<td>Decimal</td>
<td>193</td>
<td>Inter-Parliamentary Union Open Data</td>
</tr>
<tr>
<td>Press Freedom Index</td>
<td>Index</td>
<td>180</td>
<td>Reporters Without Borders</td>
</tr>
<tr>
<td>Gender Inequality Index</td>
<td>Index</td>
<td>189</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>Population</td>
<td>Thousands</td>
<td>210</td>
<td>United Nations Population Division</td>
</tr>
<tr>
<td>Tax Revenue</td>
<td>US$ millions</td>
<td>164</td>
<td>World Bank</td>
</tr>
</tbody>
</table>

\(^1\)As US states have different tax rates, the median tax rate across all states is used for the US.

Figures 1A and 1B show the distribution of the standard VAT rate and tampon tax rate across 193 countries at the end of 2021.

**Dependent Variable – Tampon Tax:**

For linear regression, the dependent variable is the discount rate on tampon tax rates compared to the standard VAT rate defined as follows:

\[
\text{Tampon Tax Discount Rate}_i = \left( \frac{\text{Standard VAT Rate}_i - \text{Tampon Tax Rate}_i}{\text{Standard VAT Rate}_i} \right) \times 100
\]

\[
\text{Tampon Tax Rate}_i = \frac{\text{VAT Rate on Menstrual Hygiene Products}}{\text{Standard VAT Rate}_i}
\]

The variable has a value range between 0 and 1. The variable of 1 indicates a 100% discount on the tampon tax rate, which means the country levies no tampon tax on sanitary products. The variable of 0 indicates zero discount on tampon tax rates, meaning the country levies the same tax rate on sanitary products as the standard VAT rate without any tax cut on products. The variable of 0.30, for example, indicates a 30% discount on tampon tax rates which means the country levies the 7% tax rate on sanitary products if its standard VAT rate of the country is 10%. For logistic regression, the dependent variable is the binary number so defined as follows:

\[
\text{Tampon Tax Cut}_i = \begin{cases} 
1 & \text{if tampon tax rate is exempted or lower than standard VAT rate} \\
0 & \text{if no tax cut at all for tampon tax rate} 
\end{cases}
\]

Figure 2A shows the distribution of the dependent variable for linear regression (discount rate on tampon tax rate), and Figure 2B shows the distribution of the dependent variable for logistic regression (1 if any tax cut and 0 if no tax cut for tampon products).

**Independent Variables**

**Press Freedom Index:**

The first independent variable is the 2021 Press Freedom Index published by Reporters Without Borders (RSF). The higher value means the journalists have more freedom to produce news for the public. Countries have been given scores ranging from 0 to 100, with 0 being the worst possible score and 100 the best. The distribution is shown in Figure 3A.

**Gender Inequality Index:**

The United Nations Development Programme publishes the gender inequality index (GII). GII is a composite metric of gender inequality using three dimensions: reproductive health, empowerment, and the labor market. The index ranges from 0 to 1, with a low GII value indicating low inequality between women and men. In contrast, a higher GII value indicates worse performance regarding gender inequality. The index shows the overall loss in potential human development due to inequality between female and male achievements in the three dimensions. This reliable index is thus used as one of the independent variables when applying the regression model. The distribution is shown in Figure 3B.

**Female Representation in Congress:**

I posited that female representation in the legislation also plays out in the tampon tax policy. The percentage of women’s representation in congress was derived from the Inter-Parliamentary Union (IPU), which publishes the percentage of women in national parliaments. This percentage measures the ratio of the total number of women legislators relative to the total number of seats filled in the parliament. The data ranges from 0 to 1. While some countries have a bicameral (two-house) legislature, others have a unicameral (one-house) legislature. From IPU data, I chose the lower or single-house women representation value to represent this variable. The distribution is shown in Figure 3C.
Control Variables:

To my knowledge, no literature used a tax cut on a particular product as a dependent variable. Thus, I set a hypothesis that a government has more room to choose a tax cut or exemption on a selected product if it already collects higher taxes from its people. To include a tax revenue per capita, I add two control variables (population size and total tax revenue) to the regression model. The population size of each country was collected from the United Nations Population Division data set for the year 2020. The total tax revenue of each country was collected from the World Bank. Given that population and tax revenue distributions are positively skewed, the variables were transformed with a natural logarithm to normalize their distributions, shown in Figure 4.

Figure 4: The left-column figures (Panel A and C) show the distributions of two control variables before the normalization, and the right-column figures (Panels B and D) show them after normalization.

H3: Higher female representation in congress leads to higher tampon tax reduction rates. When President Obama was asked why menstrual products are taxed as luxury goods in 40 states during his interview in 2016, he responded, "I suspect it’s because men were making the laws when those taxes were passed." As his interview implied, I conjectured that it is more likely that Congress will pass the bill to reduce or eliminate the tampon tax if Congress has more female representatives.

Linear Regression Models:

The first model was the linear regression model. The value of a dependent variable was defined as a linear combination of the independent variables plus an error term.

The designed models were outlined as follows:

Model 1: Tampon Tax Discount Rate = a + β Press Freedom Index, + e  
Model 2: Tampon Tax Discount Rate = a + β Gender Inequality Index, + e  
Model 3: Tampon Tax Discount Rate = a + β Female Ratio in Congress, + e  
Model 4: Tampon Tax Discount Rate = a + β Female Media Coverage, + β Female Ratio in Congress, + ΣβiCVi + e  

i = country  
PFI = Press Freedom Index  
GI = Gender Inequality Index  
CV = Control Variable  
a = intercept for equation  
βn = regression coefficient for variable n  
e = error term of prediction

Logistic Regression Models:

The second model was the logistic regression model to investigate the characteristics of countries that determine the tax cut on tampon products. The dependent variable was a binary variable with a value equal to “1” if there was any reduction in the tampon tax rate from the standard VAT rate or “0” for the tampon tax rate being equal to the standard VAT rate without any tax cut.

The designed models were outlined as follows:

Model 5: Tampon Tax Cut = a + β Press Freedom Index, + e  
Model 6: Tampon Tax Cut = a + β Gender Inequality Index, + e  
Model 7: Tampon Tax Cut = a + β Female Ratio in Congress, + e  
Model 8: Tampon Tax Cut = a + β PFI, + β GI, + β Female Ratio in Congress, + ΣβiCVi + e  

Table 2 and Figure 5 show the descriptive statistics and correlations of the variables used in the regression model, respectively. A correlation matrix is generated for the variables to test for multicollinearity. Correlation exceeding 0.6 or greater indicates the presence of multicollinearity and requires further investigation.

Table 2: Descriptive statistics of the variables used in the regression model.

<table>
<thead>
<tr>
<th>Raw Data</th>
<th>DV*</th>
<th>IV1</th>
<th>IV2</th>
<th>IV3</th>
<th>Population Tax Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard VAT</td>
<td>Tampon Tax Cut</td>
<td>Press Freedom Index</td>
<td>Male</td>
<td>Female Ratio in Congress</td>
<td>Tax Revenue</td>
</tr>
<tr>
<td>Unit</td>
<td>Decimal</td>
<td>Decimal</td>
<td>Decimal</td>
<td>Index</td>
<td>Decimal</td>
</tr>
<tr>
<td>Count</td>
<td>193</td>
<td>193</td>
<td>192</td>
<td>170</td>
<td>156</td>
</tr>
<tr>
<td>Mean</td>
<td>0.15</td>
<td>0.12</td>
<td>0.20</td>
<td>65</td>
<td>0.34</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.06</td>
<td>0.07</td>
<td>0.37</td>
<td>15</td>
<td>0.19</td>
</tr>
<tr>
<td>Min</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>19</td>
<td>0.02</td>
</tr>
<tr>
<td>25%</td>
<td>0.10</td>
<td>0.05</td>
<td>0.00</td>
<td>57</td>
<td>0.18</td>
</tr>
<tr>
<td>50%</td>
<td>0.15</td>
<td>0.12</td>
<td>0.00</td>
<td>68</td>
<td>0.36</td>
</tr>
<tr>
<td>75%</td>
<td>0.19</td>
<td>0.18</td>
<td>0.00</td>
<td>76</td>
<td>0.48</td>
</tr>
<tr>
<td>Max</td>
<td>0.27</td>
<td>0.27</td>
<td>1.00</td>
<td>93</td>
<td>0.90</td>
</tr>
</tbody>
</table>

*DV means Dependent Variable while IV means Independent Variable. Out of the tax data for 193 countries, only Hong Kong drops in DV because Hong Kong has zero VAT rate resulting in a total of 192 data for IV.
Results from Logistic Regression Models:

The results from simple logistic regressions (Models 5 to 7) were similar to those of the simple linear regressions. Press freedom, gender inequality, and female representation in congress were all shown to be statistically significant explanatory powers of the tax cut policy across countries. When these independent variables were put in the multiple logistic regression model (Model 8), only press freedom survived as a statistically significant factor that explains the tax cut policy across countries. The result in Model 8 was similar to that of the multiple linear regression in Model 4.

From the simple logistic regression in Model 5 to 7, I found the intercept and coefficient of each variable and then calculated the probability of a tax cut using the following formula:

\[
\text{Probability} = \frac{e^{a + bX}}{1 + e^{a + bX}}
\]

\(a = \text{intercept in logistic model}\)

\(b = \text{coefficient of variable in logistic model}\)

\(X = \text{independent variable in simple logistic model}\)

In Figure 6, the red dots are the observations of the binary variable Tampon Tax Cut (1 if any tax cut and 0 if no tax cut), and the blue dots are the predicted probability based on the independent variables in a simple logistic model. As seen in Figure 6A, the higher the press freedom a country has, the more likely the government will have a tax cut on tampon products. As seen in Figure 6B, the lower the gender inequality, the more likely the country will have a tax cut on tampon products. As seen in Figure 6C, the higher the female ratio in Congress, the more likely the government will have a tax cut on its tampon products.
interesting to explore international cooperation in tampon tax cut or exemption. Researchers may be interested in studying the role and influence of international bodies such as the EU or United Nations towards member states in determining their tampon tax policy.

**Acknowledgments**

I want to thank my mentor, Professor Koren Jo, who guided me to complete this research. I have learned a lot about generating research questions, using research methodology, and, last but not least, thinking about normative science. I also want to thank my teacher, Mrs. Yingru McCaughney, who kindled my passion and love for mathematical research. I am grateful for her support and encouragement throughout my study.

**References**


**Author**

Yoonjung Choi is a senior at Hong Kong International School. She realized the issue of period poverty and took action to help girls by setting up the NGO “For Girls Chapters” in four countries. She hopes to major in international relations while combining her passions for programming and social justice.