

The Influence of Women in the Workforce on Birth Rates

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Abstract

The birth rate of a country is one of the main determinants of population growth. Population growth, a critical component, influences the environment, healthcare system, education system, and overall economy of a country. The following study attempts to identify specific factors that contribute to a country's birth rate. Within this research, it is found that a higher percentage of women in the workforce will have a significant influence and lead to a lower birth rate.

Introduction

Overpopulation is a large concern that is frequently discussed and often researched, but there seems to be a lack of existing research into the factors that contribute. High birth rates can increase poverty rates and cause harm to the environment, but can also boost the economy in the long-term by increasing the labor force participation continuously. In turn, low birth rates can be better for the environment and additionally, better for the economy in the short-term. However, low birth rates can also cause problems for the future economy as an aging population leads to less participation in the labor force over time.

Methodology

A dataset containing information for 187 countries from the year 2020 was extracted from the World Bank (www.worldbank.org) to complete this study. The birthrate is the dependant variable. The three explanatory variables (summarized below) were the female percentage of the labor force, the percent of the country's population living in an urban area, and the percentage of the population between 15 and 64 years of age.

Table 1 - Summary Statistics

Variable	Mean	Min	Med	Max
A = Birth Rate, Crude (Per 1,000 People)	19.37	5.30	16.65	45.59
B = Labor Force, Female (% of Total Labor Force)	41.50	7.82	44.70	64.11
C = Urban Population (% of Total Population)	60.14	13.35	61.97	100.00
E = Population Ages 15-64 (% of Total Population)	63.33	48.62	64.51	83.41

Average Birth Rate per 1,000 People Based on Income of a Country

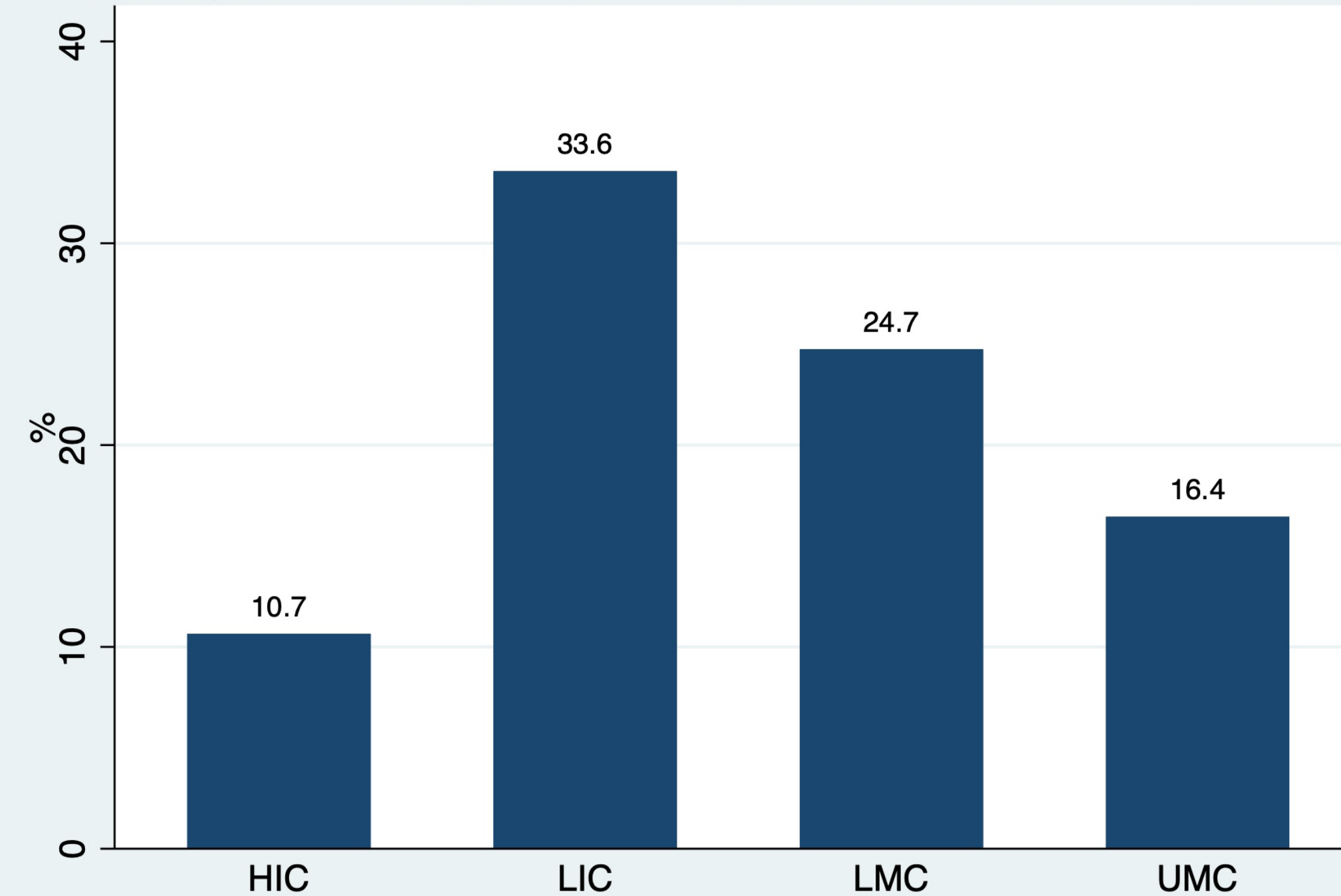


Figure 1 – Average Birth Rate Based on Income Level

Additionally, a dummy variable was introduced in order to include income levels of each country. Countries were categorized as high income (HIC), upper middle income (UMC), lower middle income (LMC), and low income (LIC). Multiple regressions were ran using the Ordinary Least Squares (OLS) method to demonstrate the individual effects of each variable from this set.

Main Findings

As pictured within the above bar graph, the lower the income of a country, the higher the country's birth rate percentage. This is consistent with predictions.

Within the Regression Results table (to the right), in R(3), all three explanatory variables are statistically significant at the 1% level. The coefficient of women in the labor force is - 6.76. This number means that a 1% increase in women in the labor force will decrease the birth rate by approximately 0.0676 births per 1,000 people. While this appears to be a small decrease, a 1% increase in the labor force is also very minimal. For example, women make up an average of 41.5% of a country's labor force. A 1% increase means women will make up to 41.92% of the labor's workforce [=41.5*(1+.01)].

Table 3 – Actual Birth Rate Compared to the Predicted Rate for Countries in North America

Country Name	Actual Value	Predict Value
Canada	9.4	10.7
United States	10.9	11.6

The accuracy of the regression is easier to see when comparing the actual values and the predicted values for the countries in North America. For Canada, our predicted value was 1.3 births per 1,000 people higher than the actual value. In the United States, our predicted value was only 0.7 births per 1,000 people higher than the actual value. Our model tended to predict slightly higher birth rates than the actual values.

Summary

Overall, our full model, $A_i = \beta_0 + \beta_1 \log(B)_i + \beta_2 \log(C)_i + \beta_3 \log(E)_i + \beta_4 D_{LIC}_i + \beta_5 D_{LMC}_i + \beta_6 D_{UMC}_i + e_i$ does an appropriate job at accurately explaining and predicting the birth rate in 187 different countries. Our results were consistent with the results of other studies and were fairly accurate when predicting the birth rates for the United States and Canada, but there are some shortcomings. Our data does not represent the religion or political restrictions for each country. Upon further research, we discovered most of these countries either had religion or political restrictions preventing women from working outside of the home. While this dataset was not perfect, the R-squared value of 0.8454 states the model explains about 84.54% of the differences in birth rates across countries and could, therefore, be used for further studies.

Table 2 - Regression Results

Variables	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
B = Female Labor Force	-2.53	-4.19**	-6.76***	-4.55***	-4.97***	-4.97***
C = Urban Population		-12.11***	-4.30***	-1.00	-0.90	-0.90
E = Population Ages 15-64			-77.34***	-61.11***	-64.93***	-64.93***
R-Squared	0.0057	0.3237	0.7867	0.8454	0.8641	0.8641

***p<0.01, **p<0.05, *p<0.1