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Angela Slauson, photographer
CROSS-NATIONAL PREDICTORS OF PRIMARY SCHOOL COMPLETION RATES

JOSH RICHEY, JAKOB CONKLING, AND JESSICA PREECE

Education is an important aspect of development, especially when considering Amartya Sen’s capabilities approach to development. Primary school completion rates are especially important because it is in primary school that basic literacy and numeracy skills are learned. What factors contribute to higher primary school completion rates? Feminist theory predicts that educated mothers are more likely to place an emphasis on their children’s education; Marxist theory predicts that capitalist-driven countries will have lower primary school completion rates to preserve the economic subordination of the proletariat; rational choice theory predicts that democracies are better equipped to provide the public good of education. We run a multivariate cross-national regression (N=57) to test predictors of primary school completion rates. We find statistically significant support for the feminist and Marxist perspectives, but do not find any support for the rationalist perspective. Our models are able to explain over 50% of the variation in primary school completion rates. In addition, our control variables yield several non-obvious results: religion has no effect on primary school completion rates, but level of expenditures on public education does.

Education is important for a country’s development when development is seen as a process that adopts methods, norms, and institutions that seek to expand the freedoms an individual can exercise. According to Amartya Sen’s capabilities approach, education is necessary for every person to have full capabilities. Sen’s approach seeks to expand “the alternative combinations

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of functionings that are feasible for [one] to achieve” (2000, 75). In the case of education, it expands the capability one has to make economic, social, and political decisions that would be limited for those without basic literary and mathematical skills. With this approach, education is a “powerful instrument for reducing poverty and inequality, improving health and social well-being, and laying the basis for sustained economic growth,” and it allows “more effective participation in economic and political activities” (Millennium Development Goals; Sen 2000, 39). When one can effectively involve him or herself in economic and political institutions and activities, freedom is greater. Thus, education is a revelation of and contributor to freedom, which in turn creates a positive process of development.

Our goal in this paper is not to show the relationship between education and development, as this has already been successfully shown. Instead, we hope to find socio-political-economic variables that promote primary school education. What factors either encourage or provide some sort of causal connection to individuals attaining an education? Is it possible to predict a country’s primary school completion rate? We believe it is possible by looking at three main variables: educational level of the female population, level of income equality, and the level of political freedoms. We will examine and show such a connection through three main approaches in detail: feminism, Marxism, and rational choice. While some of these variables, such as social treatment of women and income disparity, may fall into realms other than the strictly political, they are ultimately connected to the political realm.

Political institutions play a major role in promotion of education and the potential freedoms associated with it. To promote such freedom, schools must first enroll all school-age children and then keep them in school for the full course of the primary stage. In many countries, schools fail to do both. Children frequently drop out of school because of their own illness or that of a family member, or because their families need their labor. Some may return, but many never finish.

For example, in Viet Nam close to ninety-five percent of all children enroll in primary school. Despite this achievement, the nation’s primary school completion rate is only sixty-six percent, meaning that millions of children are not receiving a complete primary school education (UNICEF). Overall, the “vast majority of these unschooled youngsters and illiterate adults can be found in the poorest countries on earth” (Arias 2001).

In determining what level of education to examine, it is useful to look at that level that would promote basic capabilities and a minimal level of economic sustainability for the individual. In exact terms, this level is relative to a country’s economic development. For example, in the United States one could argue that a high school education, at the very least, is necessary in order to be considered economically successful. On the other hand, for those in a country that is wholly or largely based on an agricultural economy, the education
needed to be economically successful is lower. Indeed, some argue that reading and arithmetic could be ignored in exchange for an agriculturally based education. Since this project is more concerned with developing countries and primitive educational programs than with developed countries with more established educational programs, it is useful to focus on that level of education that is helpful for the developing world.

The basic level of education then, considering the goal of promoting basic capabilities and economic independence, needs to include those skills usually associated with a primary school education. Those necessary skills are basic literacy and numeracy. While these skills may not be considered sufficient in the developed world, they do provide the student with the ability to continue formal or informal education for the remainder of his or her life. Further, these skills are associated with indicators of better health, economic circumstance, and overall well-being such as lower birthrates and infant mortality (Census of India 1983, 136; Barr 1992, 229; Sen 2000, 198). Most importantly, if the youth of the developing world are not educated, how then can they have full capabilities since they do not have the basic skills to increase their sets of choices?

Theoretical Approaches

Feminism

The first conceptual framework from which to consider factors that may promote primary school completion is the feminist approach. Typically, women are seen as afterthoughts when decisions are made regarding allocation of scarce educational resources. This may be due to cultural biases or to more convoluted arguments regarding a cost-benefit analysis, which argues that it is more useful to educate men than women because men will utilize their education in the workplace while a woman's education will not be actuated but will be stifled while she sits at home cleaning house and bearing children.

However, the overall significance of an education is reinforced in the home if a mother is educated. Mothers typically have the greatest influence on their children's values; it follows that if a mother values education, it is likely that her children will also value education. Maternal reinforcement gives children more motivation to stay in school, especially if the child is female. Educated women have learned "to treat themselves and their daughters better" and thus "create a 'critical consciousness' in women (and men) about their situation" (Tomasevski 1993, 28). This means that when women are seen valuable enough to educate in a society, then the women of that society and the society itself will be better capable of creating a fair treatment of the sexes. As education creates female role models in society and in the home, norms that halt developmental progress can eventually be eroded. A UNESCO survey of the reasons girls drop out at a primary school level reported that half the responses attributed dropping out to cultural reasons (United Nations 2000, 87). These dropout rates could be greatly reduced by the influence of educated female role models. Beyond cultural
barriers, economic barriers prevent many children from completing primary school. For example, in the UNESCO survey, some reasons for female primary school dropout given under the category of economics were “not able to pay fees,” and “help needed in the family.” In underdeveloped nations the problem of economics is not limited to hindering the education of female children; it applies to male children as well. Educated mothers are more likely to make the education of their children a financial priority in the home, one more reason one should expect a positive correlation between mother’s education and primary school completion rates.

**Marxism**

In line with a Marxist approach, we predict that income inequality will be a barrier to primary school completion rates. In a capitalist system that depends on the exploitation of the proletariat’s labor, there is little room for the equality that education brings. According to the Marxist vantage point, such a system does little to encourage those in power to provide education that can help the poor improve their situation. Those in a position to provide education, the bourgeoisie, depend on the subordination of the lower classes for their lifestyle. From the bourgeois point of view, quality education threatens the economic system. As a result, we predict that the greater the economic inequality of a country (in other words, the stronger the capitalist influence in the economy), the lower the primary school completion rate.

Even if there is no conscious systemic effort on the part of the powerful to subordinate the poor, many economic barriers prevent children from completing primary school in most capitalist societies. If a nation creates education programs and institutions with high costs (either for school materials or opportunity costs, such as medical expenses or the child not being able to participate in farm or business work), poor children are unlikely to finish school. The solution to monetary costs seems somewhat simplistic (in theory) in that education for the very poor families “must be free, including no hidden costs such as uniforms, shoes or examination fees” (Tomasevski 1993, 26). Other institutions would need to be developed in order to reverse the opportunity cost, meaning that forfeiting an education would be a bigger loss than would be not working on the farm or business.

Income inequality can also affect potential primary school graduates in another way that can directly limit their school participation. If a child is not healthy, then he or she cannot devote proper time to education; also money that could be used to pay for educational expenses must be diverted from education to health care. Richard Wilkinson shows that there is a “growing body of evidence which shows that life expectancy in different countries is dramatically improved where income differences are smaller” (1997, 1). This trend is not just one in underdeveloped countries, but “poorer people in developed countries may have annual death rates anywhere between twice and four times as high as richer people in that same society” (Wilkinson 1997, 3). While the
study looks at death rates, higher income inequality is generally associated with worse health for the poor. Thus, income inequality is correlated with greater health risks, and health factors can negatively affect the education attendance of a child.

*Rational Choice*

Education is a public good. As such, it will always be underprovided in the free market. Nevertheless, governments can partially alleviate this problem by mandating taxes and then using these taxes to provide public goods. The problem is that governments do not always use taxes to provide public goods; tax revenue often lines the pockets of politicians and gets lost in corruption and bureaucracy.

One way of combating this problem is by understanding a politician's rationality. Rational choice theory claims that the approach to explain any phenomena is to show how individuals, given their preferences, act in response to incentives. Politicians, like other actors, seek to maximize their self-interest. Their underlying preferences are first, to stay in office, and second, to use that office to maximize their political and economic utility. If politicians are free to maximize their own utility at the expense of the public without political consequence, they are more likely to do so.

In contrast, if a body of citizens has political freedom and civil liberties, then it can threaten the politician with political consequences. Thus, a free citizenry can force politicians to act in accordance with public interests by creating incentives for politicians to provide affordable, quality public goods (Rodrik 1994). Hence, we predict that the level of political and civil liberties of a citizenry should be positively correlated to primary school completion rates.

*Normative Implications*

Though our paper is primarily focused on positive explanations of primary school completion rates, we acknowledge the potential normative implications of our research. If our results confirm the feminist explanation of primary school completion, there are serious implications for cultural norms. Traditionally, the education of male children has been more of a priority than the education of female children for reasons explained above. A positive relationship between female education and primary school completion rates, however, would suggest that society eventually gets "more bang for its buck" by educating women than by educating men. For the developing society that wants to increase primary school education, this could be a difficult result to internalize.

A confirmation of our Marxist predictions would be similarly difficult for many capitalist societies to swallow. Most of the wealthy choose to ignore that their lifestyle depends on the subjugation of others. Often, the wealthy assume that the poor are poor because they are lazy or less capable. However, if our results show a relationship between income inequality and primary school completion rates, it will provide strong support for the idea that the poor do not have a fair opportunity to improve their condition in life. Capitalist societies will have to recognize that income inequality perpetuates itself in a patently
unfair way — denying people the opportunity to improve their condition in life through education.

Finally, if our conclusions show that greater freedom leads to a system that encourages primary school completion, a strong case can be made for the need for democracy in developing countries. Beyond their intrinsic value, political and civil liberties may be instrumental in requiring states to provide the public goods necessary for development. This finding would certainly carry normative implications.

Nevertheless, we leave the normative questions to the philosophers. The remainder of our paper will discuss our research methods and results. First we will define how we operationalize our primary and control variables and give our hypothesized direction of each relationship. Then we will provide and interpret the results of our multivariate regressions. Finally, we will discuss some of the limitations with our research and draw some conclusions. Throughout the rest of the paper, our basic regression model is:

\[
\text{Primary school completion rate} = B_1 \text{ relative female education} + B_2 \text{ economic inequality} + B_3 \text{ freedom} + B_4 \% \text{ urban} + B_5 \text{ money spent on education} + B_6 \text{ GDP} + B_7 \text{ Muslim} + B_8 \text{ Catholic} + B_9 \text{ Hindu}
\]

**Definitions of Variables and Hypotheses**

**Theoretical Variables**

**Primary School Completion Rate (Dependent Variable):**

Definition: The primary school completion rate is the percent of children who reach grade five before quitting school. This is a statistic that is supplied by the United Nations Children's Fund (UNICEF). UNICEF obtained this data by taking measurements of specific groups of children entering their first year in school. This same group was tracked to see how many of those that entered school in the first year would reach fifth grade without quitting. Once a pattern of tracking is established, the statistic is relatively easy to obtain. Of the countries used in the possible data set, there is a variation of 3 to 100 percent who remain in school. The limitation on this data, along with many of the other variables, is that formal schooling is not a norm in all areas of the world, and because of this there is a biased response rate (UNICEF 1996).

**Relative Female Education:**

Definition: Relative female education is the average years of schooling for females as a percentage of the average of years of schooling for males. If 'F' represents the average years of schooling for females and 'M' that of the male population, the statistic would be obtained by creating an equation: relative female education = 'F'/'M'. This statistic was provided by UNICEF as part of their yearly report on the progress of nations. The data collected to explain this variable ranges from 14.3% to 148.1%. This means that if the statistic is 50%, then women (on average) complete half as much school as men. If it is 100%, then women complete the same amount of schooling as
do men. If it is 150%, then women complete 1.5 times the amount of schooling that men complete. A major limitation to the set of data is that we cannot with absolute certainty state that our set of data is complete because it is possible that many rural locations may be excluded during the collection of data. Further, as noted by the title, this statistic measures relative level of female schooling, not absolute level. One advantage is that this controls the overall education level of the country; however, interpretation is more difficult because it is a more complicated statistic (UNICEF 1996).

Hypothesis 1: We expect that the higher the level of relative female education in the country, the higher the percentage of children that will finish the fifth grade.

Level of Income Inequality (Inequality):

Definition: The measure of inequality used is the reliable Gini Index, which provides an easily interpreted way to view income disparity in a nation. This index was created as a function of another measure called the Lorenz curve. The Lorenz curve plots the percentage of the total wealth of a nation against the cumulative percentage of recipients of that wealth. The income distribution is plotted in quintiles. Perfect distribution says that 20% of the population receives 20% of the wealth. The GINI index is a calculation of how much area lies between the Lorenz curve and the line that represents perfect equality. If a country achieves a ‘0’ on the GINI index, this indicates that the nation has perfect equality of income distribution. A score of ‘100’ on the GINI represents perfect inequality of income distribution. The range represented by our data set spans from 19.5 to 62.9 (World Bank 1998).

Hypothesis 2: Our prediction is that increased income inequality will negatively affect the number of children finishing fifth grade.

Level of Freedom (Freedom):

Definition: This variable is an average of two Freedom House ratings: civil liberties and political rights. These two variables were created and measured by Freedom House in the 1997 report Freedom in the World. The scale used is a seven-point scale where 1 is the most free and 7 is the least free. These variables are created using survey data and analysis by a board of educators and professionals in the field of international politics. Unfortunately, this is a fairly subjective qualitative measure not well adapted to the quantitative realm. It is not a perfect representation of the level of freedom, but it is an acceptable measure (Freedom House 1997).

Hypothesis 3: We hypothesize that there will be a positive relationship between the level of freedom and the percent of people completing the fifth grade. When freedom is close to perfect, or close to 1 on this scale, then the number of people completing the fifth grade will be relatively large.

Control Variables

Percent Urban (Urban %):

Definition: This is the percent of people who lived in an urban area of the country as opposed to those who lived in rural farmlands in 1995. This
indicator is estimated through a census performed in every country. Our data has a range of 6% to 100%. Isolated rural populations may be left out of the statistic which somewhat limits the power of this variable (United Nations 1998 A).

Hypothesis 4: We use the percent of the population living in urban areas as a control variable. It is our position that the introduction of this variable to the set will allow us to control for the possibility that it is easier to educate children in concentrated urban areas than in dispersed and isolated rural areas. We predict that, as the percentage of the population living in urban areas increases, the number of people receiving a formal education, at least through the fifth grade, will also increase.

Money Spent on Education ($ Education):

Definition: This variable was created by dividing the total amount of government spending on public education by the Gross Domestic Product (GDP) of a given nation. The data associated with this variable was collected from the Human Development Report, which is created by the United Nations annually. This particular set of statistics is from the year 1995, but was taken from the report dated 1998. The data ranges from 0 to 10.6%. This states that at the top end, 10.6% of the GDP is being spent on public education, and at the bottom end, 0% of the GDP is being spent on public education. A major limitation of this data is that it only includes governmental expenditures (or loans to the government for educational purposes). However, in many countries (especially in Africa), a large number of people are receiving their education by means other than those subsidized by the government. Religious organizations and INGOs often provide such services (Schafer 1999). Still, the percentage of people who benefit from government-subsidized programs as opposed to those who receive an education by other means is very large. We therefore feel justified in our selection of this variable (United Nations 1998 B).

Hypothesis 5: We hypothesize that an increase in governmental spending on education will increase the total number of people who finish fifth grade. This increase in spending would be associated with higher teacher salaries, curriculum improvements, more schools, technological improvements, etc., all of which may contribute to a system that fosters higher primary completion rates.

Gross Domestic Product Per Capita (Square root GDP/Cap):

Definition: This variable has been standardized into U.S. Dollars and represents the total wages, rents, profits, and interest produced within a nation divided by the number of citizens living in that nation. Information on GDP was taken from the 1997 World Fact Book published by the Central Intelligence Agency (CIA). The data in this set ranges from $400 to $28,600. Of course, not all of the resources represented by this figure directly benefit the people of the nation, especially in nations with high levels of corruption. The GDP data is highly skewed, so we attempted a logarithmic transformation of that data which, unfortunately, proved unsuccessful. The next best approach
was to take the square root of each GDP statistic. The square root method was successful in normalizing the data; however, the results are more difficult to interpret as a result of the transformation (Central Intelligence Agency 1997).

Hypothesis 6: We predict that the higher the GDP per capita, the better the primary school completion rates of the nation will be. This is slightly obvious when comparing developed to developing nations, but when looking at developing nations alone, small increases in GDP will not always translate into better things for the people. However, we hold that increases in GDP will produce increases in the number of people finishing the fifth grade.

\( \text{Ln Percent Muslim (Muslim)}: \)

Definition: This data is part of our effort to control for the cultural differences in the world. It is a measure of the percent of people professing to be of the Islamic faith in the specific country. This is a simple percentage of the whole. The range of the data is \( 0 \) to \( 100\% \). This information was collected from the World Christian Encyclopedia from the year 1982. The year collected promotes an obvious limitation, but the fact that the number of people in any given religion does not tend to change very drastically over the 20-year time lag calms our concerns. Other irregularities with the data consist of a very skewed data set. In order to alleviate this problem a logarithmic transformation was applied for normalizing purposes (World Christian Encyclopedia 1982 A).

Hypothesis 7: Though we recognize that Islam values education, many Islamic nations limit educational opportunities, especially for women. In keeping with common perceptions, we hypothesize that a higher percentage of Muslims in a country will result in a decrease in the completion rate for primary education.

\( \text{Ln Percent Catholic (Catholic)}: \)

Definition: The percentage of the population that is Catholic in any given country is the information that this particular data measures for us. Also gathered in 1982 by the World Christian Encyclopedia, the same time lag problem exists here that existed for our Muslim variable. However, once again, we feel that the percentages have been fairly static through the years and, as such, do not create a very large problem. The range in the data for this statistic is from \( 0 \) to \( 97.3\% \). Again, the data was highly skewed. In order to alleviate this problem, a logarithmic transformation was applied for normalizing purposes (World Christian Encyclopedia 1982 C).

Hypothesis 8: We predict that the nations with a stronger Catholic influence will have an increased level of education for their people. The Catholic religion has a tradition of providing educational opportunities for those who seek them in many areas of the world. This can be witnessed throughout the Western world with the construction and use of the historic Catholic missions.

\( \text{Ln Percent Hindu (Hindu)}: \)

Definition: This statistic measures the percentage of people in each nation that profess Hinduism as their religion. This statistic was taken from the
1982 World Christian Encyclopedia, and has the aforementioned time lag deficiency. The range that we see with this statistic is 0 to 89.6%. Due to the relatively small number of nations with a significant Hindu population, we created a dichotomous variable to correct the skewed nature of the distribution. A '0' was assigned to the nations with less than 10% of the population belonging to the specific religion, and a '1' assigned to the rest. The 10% partition was somewhat arbitrary, but we felt that it was an adequate level for the religion to have influence in the nation (World Christian Encyclopedia 1982 B).

Hypothesis 9: We predict that a higher percentage of Hindu people will result in a lower completion rate at the primary school level. This relationship is expected primarily because of the cultural tradition of castes that exists in the Hindu society. Although not formally recognized by the government or other entities, this system is still prevalent in practice. The caste system creates a lack of mobility from one class level to another, and thus also limits the amount of educational opportunities for those without prestige or money (which represents a large portion of society).

**Statistical Results**

To test our hypotheses, we ran a cross-national multivariate ordinary least squares regression. Our initial results were disappointing. Table 1 shows that our main independent variables, relative female education (p-value= .287), level of inequality (p-value=.098), and level of freedom (p-value=.461), are not significant at the .05 level. Percent urban (p-value=.233) and the religious control variables (Muslim: p-value=.540, Catholic: p-value=.889, and Hindu: p-value=.342) are not significant either. The significant variables are proportion of money spent on education (p-value= .044), and square root of GDP/capita (p-value= .035). The adjusted R-squared for the equation is .5306, suggesting that 53.06% of the variation in the primary school completion rates can be explained by the independent variables. This shows fairly strong substantive significance for the overall regression.

However, to get a more accurate picture of the relationship between the significant independent variables and primary school completion rates, we reran the regression using a backward elimination stepwise regression to remove the insignificant independent variables one at a time. Table 2 shows the results after seven steps (alpha to remove= .20). Again, we see that proportion of money spent on education (p-value=.036) and square root of GDP/capita (p-value= .000) are significant. In contrast to the original regression, level of inequality (p-value=.036) becomes significant when the insignificant independent variables are removed. Adjusted R-squared changes marginally to .5584.

Looking at the coefficients of the independent variables, we see that, as we hypothesized, proportion of money spent on education and square root GDP/capita have a positive effect on primary school completion rates. In fact, proportion of money spent on education shows very strong substantive significance: increasing proportion of money spent on education by one unit yields a
**TABLE 1**

**Dependent Variable: Primary School Completion Rates**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative female education</td>
<td>.109</td>
<td>.287</td>
</tr>
<tr>
<td>Inequality</td>
<td>-.35</td>
<td>.098</td>
</tr>
<tr>
<td>Freedom</td>
<td>-1.4</td>
<td>.461</td>
</tr>
<tr>
<td>% Urban</td>
<td>.16</td>
<td>.233</td>
</tr>
<tr>
<td>$ Education</td>
<td>2.17</td>
<td>.044</td>
</tr>
<tr>
<td>Square root GDP/capita</td>
<td>.181</td>
<td>.035</td>
</tr>
<tr>
<td>ln % Muslim</td>
<td>.33</td>
<td>.540</td>
</tr>
<tr>
<td>ln % Catholic</td>
<td>-.13</td>
<td>.889</td>
</tr>
<tr>
<td>Hindu</td>
<td>8.3</td>
<td>.342</td>
</tr>
<tr>
<td>Constant</td>
<td>57.72</td>
<td></td>
</tr>
<tr>
<td>Adj. R²</td>
<td>.5306</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2**

**Dependent Variable: Primary School Completion Rates**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inequality</td>
<td>-.350</td>
<td>.036</td>
</tr>
<tr>
<td>$ Education</td>
<td>2.02</td>
<td>.036</td>
</tr>
<tr>
<td>Square root GDP/capita</td>
<td>.213</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>63.17</td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>.5584</td>
<td></td>
</tr>
</tbody>
</table>
CROSS-NATIONAL PREDICTORS OF PRIMARY SCHOOL COMPLETION RATES

TABLE 3

**Dependent Variable: Primary School Completion Rates (without Lesotho)**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative female education</td>
<td>.292</td>
<td>.013</td>
</tr>
<tr>
<td>Inequality</td>
<td>-.34</td>
<td>.078</td>
</tr>
<tr>
<td>Freedom</td>
<td>-2.4</td>
<td>.203</td>
</tr>
<tr>
<td>% Urban</td>
<td>.08</td>
<td>.531</td>
</tr>
<tr>
<td>$ Education</td>
<td>3.07</td>
<td>.004</td>
</tr>
<tr>
<td>Square root GDP/capita</td>
<td>.140</td>
<td>.081</td>
</tr>
<tr>
<td>ln % Muslim</td>
<td>.32</td>
<td>.526</td>
</tr>
<tr>
<td>ln % Catholic</td>
<td>-.36</td>
<td>.668</td>
</tr>
<tr>
<td>Hindu</td>
<td>9.0</td>
<td>.271</td>
</tr>
</tbody>
</table>

Constant 52.15
Adj. R² .5888

TABLE 4

**Dependent Variable: Primary School Completion Rates (without Lesotho)**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative female education</td>
<td>.225</td>
<td>.026</td>
</tr>
<tr>
<td>Inequality</td>
<td>-.44</td>
<td>.011</td>
</tr>
<tr>
<td>$ Education</td>
<td>3.00</td>
<td>.003</td>
</tr>
<tr>
<td>Square root GDP</td>
<td>.146</td>
<td>.034</td>
</tr>
<tr>
<td>Constant</td>
<td>63.15</td>
<td></td>
</tr>
</tbody>
</table>

Adj. R² .5584
2.02% increase in primary school completion rates on average. Increasing the square root of GDP/capita by one unit results in a .213% increase in primary school completion rates on average. However, interpreting the substantive significance of the coefficient for the GDP measure is more difficult because of the square root transformation. Also as hypothesized, level of inequality has a negative effect on primary school completion rates: a one unit increase of inequality on the GINI scale decreases primary school completion rates by .35% on average. This shows a significant but fairly weak relationship between inequality and primary school completion rates.

Our results suggest several conclusions. First, one can see that the proportion of money spent on education seems to have the biggest effect on primary school completion rates. Though this may seem like an obvious result, given the level of bureaucratic inefficiency and corruption in many developing countries, it is a surprisingly encouraging result for the developing world. Second, it is unsurprising that the GDP measure is significant. One would expect that wealthier countries would have a more educated population, though the direction of the relationship between wealth and education could be endogenous. Third, the level of inequality in a country is important. It appears that an unequal system perpetuates itself by reducing the educational opportunities for the poor.

Though these results are interesting, there are several problems with the data that suggest some necessary modifications to the model. One country, Lesotho, had a particularly high standardized residual and showed moderate influence on the overall regression line. Upon closer inspection, we found that Lesotho has the highest relative female education score in the data set: 148. (This means that the average number of years of schooling a woman completes in Lesotho is 148% of the average number of years a man completes.) Though we did not have a pre-existing theoretical reason to suggest that Lesotho should be removed from the data set, we decided to rerun the regression without Lesotho to see what the results were.

Table 3 shows the initial regression results without Lesotho in the data set. The results are markedly different from the first set of regressions. Level of freedom (p-value= .203) remains insignificant, as do the religious variables (Muslim: p-value= .526, Catholic: p-value= .668, and Hindu: p-value= .271) and the urban measure (p-value= .531). However, level of inequality (p-value= .078) and square root GDP/capita (p-value= .081) lose significance at the .05 level, and relative female education level becomes very significant (p-value= .013). Proportion of money spent on education maintains significance (p-value= .004). The adjusted R-squared is .5888, which suggests that 58.88% of the variation in primary school completion rates can be explained by the independent variables. As with the first set of regressions, this shows fairly strong substantive significance for the overall regression.

As we did previously, we reran the regression using a backward elimination stepwise method (alpha to remove=.20). The results are in Table 4. Relative
female education (p-value = .026), level of inequality (p-value = .011), square root GDP/capita (p-value = .034), and proportion of money spent on education (p-value = .003) are significant at the .05 level. Freedom remains in the equation because its p-value is less than the .20 necessary to be removed, but it is not significant at the .05 level. Adjusted R-squared is .5584, which suggests that nearly 56% of the variation in primary school completion rates can be explained by this simplified equation.

Examining the coefficients yields satisfying results. Most interestingly, removing Lesotho from the data set makes the level of relative female education solidly significant. A one unit increase in the average number of years of education a female completes as a proportion of the average number of years of education a male completes results in a .225% increase in primary school completion rates on average. Level of inequality still has a negative effect on primary school completion rates in this model: a one unit increase in the GINI scale yields a .44% decrease in primary school completion rates. Conversely, increasing square root of GOP/capita by one unit yields a .146% increase in the dependent variable. As in the previous model, proportion of money spent on education plays a very important role in predicting primary school completion rates: a one unit increase in the proportion of GDP spent on education results in a 3.00% increase in the dependent variable.

The biggest difference in the results of this data set from the previous one is that relative level of female education becomes very significant when Lesotho is removed. Some may question our removal of Lesotho from the data set. However, removing Lesotho from the data set does not mean that our results are invalid; it simply means that our model cannot predict the effect of relative female education on primary school completion rates when level of female education is much, much higher than the level of male education. To further alleviate any concern about data manipulation, we included the regression results of both data sets.

We did face one fairly serious problem with all of the equations. A plot of our residuals versus predicted values showed significant heteroskedasticity. Countries with low levels of primary school completion rates had larger residuals than countries with higher levels of primary school completion. Logarithmic transformations did not solve this problem. Ideally, we should run a weighted least squares regression to alleviate this problem. However, this is currently beyond our statistical ability. Instead, we suggest some caution when interpreting standard error/p-values and note that our model has more predictive power for countries with higher levels of primary school completion rates than those with lower levels. Given our normative motives, this is somewhat disappointing. Nevertheless, these are our results.

Conclusions

Our regression results support some of our main hypotheses. In summary:

Hypothesis 1: That increased relative female education has an effect on primary school completion rates is at least partially supported. Relative female
education is not significant in the model with Lesotho, but is significant when Lesotho is removed from the data set. Since Lesotho has an unusually high rate of relative female education, we conclude that our theoretically feminist hypothesis holds within reason.

Hypothesis 2: Increased levels of income inequality negatively affect primary school completion rates in both our data sets. This supports the Marxist view that unequal societies perpetuate themselves by denying opportunities to improve one's condition.

Hypothesis 3: These data offer no support for the hypothesis that increased levels of freedom promote better provision of public goods through incentives for politicians. Further research may be necessary to determine if these results are consistent upon replication.

We also found some interesting results with our control variables. First, the urban/rural split of a nation has no significant effect on primary school completion. Second, our results show that the proportion of money spent on education has an indisputable effect on primary school completion rates. When considering developing countries, this is a non-obvious, encouraging statistic. It suggests that governments can increase education levels if they are willing to devote resources to education.

What is perhaps most interesting is our discovery that religion seems to play no role in determining primary school completion rates when other factors are controlled. Hence, the severe criticism of religion, and of Islam in particular, may not be warranted. Perhaps the results would differ when measuring female completion rates in particular. Nevertheless, we find no support for condemnation of religion in these results.

Education has intrinsic value as well as extrinsic value when considering development as freedom. The basic literacy and numeracy skills taught in primary school are especially important. Our study suggests several predictors for primary school completion rates. Further, we acknowledge that these results have normative implications. We encourage concerned countries to consider our results.

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WORKS CITED


