Evolving Social Norms,

Disincentivized Families, and the Persisting Gender Gap in Education

Eveleyn Wideman
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INTRODUCTION

As the old adage goes, "Educate a man, and you educate an individual; educate a woman, and you educate a whole nation." Education is one of the single most effective investments for developing countries, and female education in particular creates effects far beyond the economic prosperity of the educated individual. As the role of primary caregiver remains predominantly filled by women across the world, the educational opportunities available to girls results in better-educated mothers having fewer but healthier children who will also go on to attain higher levels of education. Thus, the education of girls today is doubly important for a nation's prosperity tomorrow.

Despite international efforts toward realizing gender equality in education, such as the UN's Millennium Development Goals, Sub-Saharan Africa still lags behind other developing regions in school enrollment gender parity indices. The region has consequently felt the impact of this gender gap—slower economic growth, higher fertility and infant mortality rates, shorter life expectancy, and fewer educational opportunities for the next generation. To understand the phenomenon of the gender gap, it is critical to first consider the factors that inhibit girls from attending and finishing school—such as traditional norms and expectations for women as well as the incentives faced by families when choosing to allocate funding toward their children's education.

This global issue can be framed with political economic theory and analyzed as a collective-action problem (CAP). Previous research asserts that countries with large Muslim populations have significantly larger gender gaps in education and the accompanying adverse economic effects. While many researchers have attempted to rationalize how religion can affect female education opportunities, this paper aims to distinguish between embedded social norms and broader religious practices. Using political economic theory and game-theoretic modeling, this paper will frame persisting education gender inequality as a positive externality good with underlying social norms, social sanctions, and disincentives for families' education investments. Employing panel data from the World Bank and World Values Survey, the empirical analysis section will test the hypothesis that social norms play a significant role in perpetuating the gender gap in education and its resulting suboptimal economic effects.

BACKGROUND

Reducing gender inequality in education is a crucial component of economic development. Primary education has been shown to have the highest rate of return on investment for developing economies; more specifically the rate of return for women's education is higher than that of men (Psacharopoulos, 1994). Educating girls not only translates to increases in human capital and economic growth, but also creates future benefits for educated mothers. Maternal education is linked to lower fertility and infant mortality rates, better health and education of children, and increased life expectancy (Norton and Tomal, 2009). Considering both the direct effects on current economic growth as well as these positive lagged effects resulting from increases to the next generation's human capital, gender equality in education should be an international priority.

Key human development indicators that are correlated with female education quantify the impact that maternal education has on future generations. In a cross-sectional study of Sub-Saharan African countries, Browne and Barrett (1991) find a -0.627 correlation coefficient between infant mortality and female literacy as well as -0.677 correlation coefficient between under-5 mortality and female literacy, both values being significant at the 99 percent level. Furthermore, Browne and Barrett find a 0.734 correlation coefficient between female literacy and child immunization uptake rate, also significant at the 99 percent level. Hill and King (1995) find that a 10 percent increase in the female primary enrollment

rate corresponds with a reduction of 4.1 deaths per 1000 lives births in the infant mortality rate while a 10 percent increase in the female secondary enrollment rate corresponds with a reduction of 5.6 deaths per 1000 live births in infant mortality. Examining fourteen Sub-Saharan African countries, Ainsworth, Beegle, and Nyamete (1996) find that the higher the education level of a couple, the lower their fertility rate. However, isolating the mother's educational attainment proves to have a significantly larger negative effect on fertility than the schooling of the father. Together these studies support that better-educated women are more likely to make use of contraception and modern preventative health services, and thus ultimately raise healthier children with greater economic potential.

Moreover, a lack of female education opportunities can have grave implications for not just the wellbeing of a country's next generation but also its economy. Hill and King (1995) find countries with female-to-male enrollment ratios less than 0.75 to have roughly 25 percent lower GNP levels, holding constant female educational level, size of labor force, and capital stock. Research conducted by Klasen (2002) supports that improvement in educational gender equality has a significantly positive impact on economic growth, but further asserts that the magnitude of this effect is significantly higher in Sub-Saharan Africa relative to other regions. Klasen rationalizes these findings by proposing that Africa's agrarian economies suffer significantly more from undereducated female populations because women play such a pivotal role in African farming. Various World Bank studies affirm that educated farmers are, not surprisingly, more productive farmers. Thus the heavily agriculture-based economies of Sub-Saharan African countries would realize substantial gains from improving the education opportunities available to their largest demographic of farmers—women.

Promoting gender equality and empowering women have been key focal points for the agendas of many international organizations; the United Nations addressed both of these initiatives in their third Millennium Development Goal established in 2000. From UNICEF to the White House's Let Girls Learn initiative, countless international organizations fight for progress in female education. Despite these initiatives, Sub-Saharan Africa has lagged behind other developing areas in reaching gender parity in education, and women in Africa remain the most undereducated in the world (Shabaya and Konadu-Agyemang, 2004). Historically, African women have experienced the lowest average annual increase in total years of schooling. Between 1960 and 1990, the average years of schooling for African women increased by a mere 1.2 years, which equates to a 0.04 per year increase over the thirty-year period (Klasen, 2002). As of 2013, enrollment ratios in Chad and the Central African Republic had flat-lined at less than 70 girls per 100 boys while in Niger the rate remains even lower at 41 girls per 100 boys. In total, fourteen Sub-Saharan African countries had fewer than 90 girls per 100 boys at school (The Economist, 2013). While this number suggests near parity in some countries, the statistics pale in comparison to countries like Sweden and India where 110 and 106 girls respectively per 100 boys were enrolled in school (World Bank, 2014).

Considering the heavily documented benefits of female education, the persistence of the education gender gap in Sub-Saharan Africa clearly has adverse implications for human development and economic growth. As President Barack Obama stated at the United States of Women Summit in June 2016, educating girls is an issue of national security. Societies that inhibit half the population from gaining an education and joining the workforce are more likely to experience instability, violence, and terrorism in the long run in addition to slower economic growth. Thus, gender equality in education has become an increasingly high priority for foreign policy and international organizations over the past two decades. However, to better understand how to address the problem and incite positive change, it is critical to first identify its root causes.

Previous economic literature on the education gender gap has examined the relationships between culture, religion, and female education. Norton and Tomal (2009) analyze cross-sectional data on 97 countries from an earlier study by Barro and Lee (1993) to investigate the link between major religions and female educational attainment. Their study reports Buddhism, Protestantism, and nonreligious factors have no significant effect on female education; Catholic, Orthodox, and Hindu affiliations have negative effects on female secondary educational attainment; and ethnoreligions and Islam have significantly negative effects on female educational attainment at every level. In a similar study, Daun (2000) categorizes Sub-Saharan African countries by economic level, percentage of Christians, percentage of Muslims, and type of state (growth-oriented, equality-oriented, other). He finds strongly Muslim countries to have significantly lower female school enrollment rates in

every economic category in every type of state relative to strongly Christian countries.

While the cited research supports a link between Islam and lower female educational attainment, Cooray and Potrafke (2010) investigate whether religion and culture or rather political institutions truly underlie gender inequality in education. Their study examines 2006 data on 157 countries, finding Islam to have a significant negative effect while democracy has no effect. As these results further support, democratic political institutions may have no effect on gender parity in education, but the relevant economic research consistently supports that there is a negative relationship between the prevalence of Islam and gender equality in education.

Previous literature might assert the significant role that religion plays in the education gender gap, but political economic theory provides a framework to further analyze its root causes. Elements of political economy as well as game-theoretic modeling can help deconstruct the education gender gap and provide insight on its complexities. As outlined in the following section, the dynamics of positive externality goods and social norms interacting with first- and second-order collective-action problems help frame the phenomenon of education gender inequality.

POLITICAL ECONOMIC THEORY

Educational gender inequality in Africa is an undeniably complex problem; religious beliefs, child labor, rural location, as well as other factors are all likely to aggravate its pervasiveness. While previous literature has found countries with certain religions—particularly Islam—to have significantly lower female enrollment rates (Daun, 2000; Norton and Tomal, 2009), there is little research to confirm whether or not social norms that oppress women lie at the heart of the problem. Cooray and Potrafke (2010) assert that culture and religion play a larger role in gender inequality in education than formal political institutions. However, as political economic theory would suggest, informal institutions can play fundamental roles in creating and/or resolving suboptimal economic conditions. The application of political economic theory and game-theoretic models can help explain the economic as well as social aspects of gender inequality in education and distinguish social norms from broader belief systems like organized religion.

Gender inequality in education can be modeled as a collective-action problem because the female enrollment rate is lower than the socially optimal outcome—full or nearly full enrollment, or at least parity with the male rate. In the most general sense a collective-action problem occurs when there is a disparity between the interests of the rational individual and the wellbeing of society as it pertains to the allocation of a resource. Considering that female education has many positive externalities for society, low female enrollment rates are first-order CAPs because they deal directly with the underproduction of a resource—in this case female education.

From a theoretical perspective, resolution of the education gender gap as a first-order CAP requires a firm understanding of the second-order CAPs[1] surrounding it. Traditional attitudes perpetuating the limited rights and abilities of women still persist in many cultures and serve as a bedrock for this first-order CAP. This informal institution, social norms deterring female education, also generates a large obstacle to realizing gender parity in enrollment rates[2] through effective coordination and enforcement of arrangements to solve the problem. Even if a formal institution like the national government tried to enforce the equal enrollment of boys and girls in school, families might still be incentivized to violate any legislation put in place and prioritize the allocation of school funds for their sons. Moreover, the expectation that other families will neglect their daughters' education only further discourages a family—acting as a reciprocal player in the marriage pool—from investing in their own daughter's education.

Before analyzing the second-order CAPs surrounding gender inequality in education, it is necessary to first consider the driving factors of the first-order CAP, namely social norms. One interpretation of traditional norms or attitudes suggests that girls are meant to work in the home, get married off at a young age and have children, and/or simply should not be given as many freedoms as boys. While many cultures have adopted much more progressive ideologies over the past century, these attitudes still persist in parts of the world and are often associated with more conservative religious beliefs, like those of Muslims. These attitudes and their resulting behaviors, such as parents failing to allocate funds for, discouraging, or forbidding their daughter's education, can be considered one type of informal institution.

Ferguson describes informal institutions are "expected, mutually understood, and context-dependent behavioral prescriptions that emerge from repeated social interactions, rather than from formally designated deliberation" (2013, p. 166). Where these traditional

attitudes regarding female education still persist, it is mutually understood and expected that a girl's place is in the home. Filling her role as a bride and mother does not demand the costly investment in her education. However, there are likely no formal rules in place that actively forbid families from enrolling their daughters in school. Framing these attitudes as an informal institution explains how they systematically influence societal outcomes.

Within the typology of informal institutions, gender inequality in education can be attributed to a typical social norm. The syntax of institutions developed by Crawford and Ostrom (2005) explains this categorization through the ADICO framework, which identifies five components of institutional prescriptions: attributes (A), deontics (D), aims (I), condition (C), and or-else (O) (Ferguson, 2013, p. 168). With regard to female education, traditional attitudes assert that children (A) are not permitted or entitled to (D) attend school and pursue an education (I) if they are girls (C). There is not an or-else (O) component of the prescription because there would not usually be specified consequences and specified enforcers to apply sanctions. While the applicable ADIC components illustrate how educational gender inequality corresponds to the typical social norm category, the role of social sanctioning and internalization reasserts this typology.

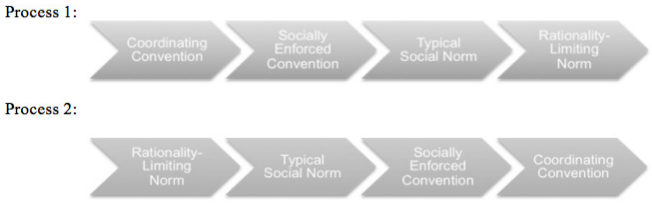
A typical social norm relies on internalization as well as social enforcement, that is A) people believe in the norm (have internalized it) so they will follow it even without others watching and B) if someone breaches the norm, those around them would impose a social sanction (Ferguson, 2013, p. 167). Pertaining to female education, some families may choose not to send their daughter to school regardless of whether or not there are neighbors nearby to observe their choice (internalization). On the other hand, for families who are considering educating their daughter, observers might look down upon or ostracize (social sanctioning) the family for allowing their daughter such a freedom or express that they are foolish to invest their money in her education, thereby altering the family's decision.

It is critical to note that this is only one interpretation of gender discrimination in education. Different communities might experience iterations of this informal institution. In some extremely conservative communities or in the past, the education gender gap could be attributed to a rationality-limiting norm[3] because educating girls was completely out of the question. However, globalization makes it increasingly unlikely that a community would be unaware that female education is at least a viable possibility.

Ferguson (2013) proposes that as informal institutions endure and acquire broader compliance mechanisms, they can shift from a loose coordinating convention[4] to a socially enforced convention, to a typical social norm, and possibly all the way to a rationality-limiting norm. In the case of traditional attitudes about female education, this paper proposes that norms can actually shift the opposite way along the spectrum, as illustrated by Process 2 in Figure 1. At one point the idea of educating women was not even considered. However, in various times and places since then people have actually considered the feasibility of female education. Yet, that consideration was met by internal conflict for not abiding by the internalized norm as well as by disapproval from others who have internalized the norm (social sanctioning).

On a global scale, traditional attitudes discouraging female education are quite likely to eventually shift to a socially enforced convention—upheld only through social sanctions and no longer internalized by anyone—before completely phasing out. This norm would not shift to a coordinating convention, but its antithesis of educating girls and boys equally could become its own coordinating convention. Thereafter gender equality in education could shift along the spectrum toward a rationality-limiting norm (Process 1 in Figure 1), which would ultimately completely invert the original social norm. Arguably, in places like Sweden and Belgium where the number of girls enrolled in school per boy enrolled is greater than or equal to 1.10, this norm reversal has already taken place.

Figure 1.



Returning to the framing of the persisting education gender gap as a typical social norm, upheld through internalization and social sanctions, merits discussion of identity. As described by Ferguson (2013), people often identify with the behaviors prescribed by norms that they have internalized. When they abide by norm-prescribed behavior, they are also abiding by their own conceptions of appropriate behavior and thus

affirming their identity. Interaction between individuals with distinctly different identities can either support or challenge their identity concepts (Ferguson, 2013, p. 191-193). Identity can be better understood with the two following functions. First, here is a more expansive utility function:

$$u_i = u_i(a_i, a_{-i}, I_i) = u_i(a_i(\pi, I_i), a_{-i}(\pi, I_{-i});\ I_i)$$

As the function illustrates, agent i's utility is dependent upon their own actions, the actions of relevant others, and their own identity. Actions undertaken by both agent i and relevant others take into account both material payoffs (ϖ) as well as identity payoffs (I_i and I_{-i}). Identity payoffs are further dependent upon whether or not actions are consistent with the individual's identity concept. The second equation better illustrates the determinants of identity payoffs:

$$I_i = I_i(a_i, a_{-i}, C_i, \varepsilon_i, \Psi)$$

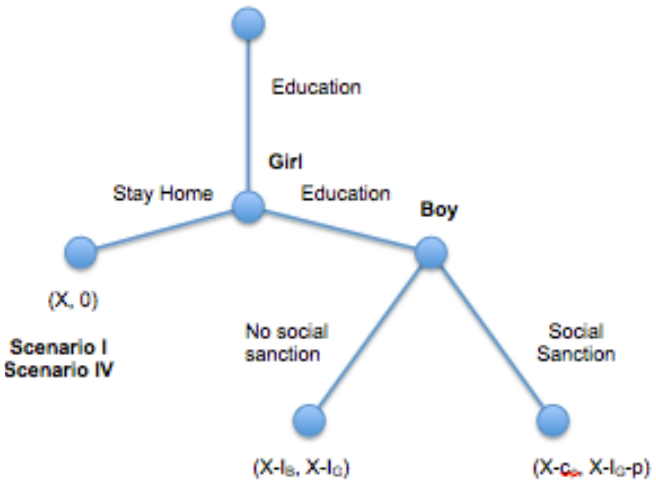
As previously stated, identity payoffs are largely dependent upon the actions of both agent i and other relevant individuals. C_i represents agent i's conception of social categories that they and relevant others fall into. ε_i represents agent i's personal characteristics and Ψ represents applicable social norms.

In the case of female education in a male-dominant society, there are resulting negative identity externalities. Where strict gender roles prevail, norms prescribe that boys exclusively pursue education and girls remain in the home (housekeeping). Thus if a girl enrolls in school, she is theoretically threatening the identity of boys as well as experiencing an identity loss for not abiding by the internalized norm.

Shabaya and Konadu-Agyemang (2004) theorize that European colonists brought Victorian-era values about girls to Africa, only further reinforcing the preexisting African values that designated gender roles. Girls were expected not to participate in certain activities, especially those that might enlighten them and encourage them to challenge male dominance and hegemony (Shabaya and Konadu-Agyemang, 2004, p. 414-415). Consequently, female education was generally frowned upon with the exception of the elite class. Patriarchal societies shaped their education opportunities to cater to boys, which further discouraged parents from investing money in their daughters' education when they would be married off into another family and provide no return on investment for their birth family.

Returning to the idea of negative identity externalities[5] resulting from female education, Figure 2 illustrates the interaction between genders as they navigate the allocation of education. Assume that there are two players: boys and girls. While this example is significantly simplified, the interactions between genders aggregate to form macro-level outcomes. There are two available strategies: enrolling in school and staying home to work in the household. There are two identities: the male identity, which prescribes exclusively boys to enroll in school, and the female identity, which prescribes girls to stay at home. Both boys and girls prefer enrolling in school (payoff X), but girls experience a slight identity loss when they go against the prescribed norm of staying home (I_G) and boys, experiences an identity loss when girls enroll in school (I_B). If the girl chooses to enroll in school, the boy has the option to impose some kind of social sanction on the girl at a cost c, resulting in loss of –p for the girl.

Figure 2.



As illustrated in Figure 2, the equilibrium outcome will depend on the relative values of the original payoff from enrolling, the identity losses to both boy and girl when the girl enrolls, the cost of social sanctioning inflicted on the girl for enrolling, and the cost of sanctioning incurred by the boy. If $c_p < I_g$ and $I_b < X < I_g + p$, the boy would sanction so strongly that the girl chooses to stay home $c_p < I_g$ (scenario i). If and $I_b + p < X$, the boy would sanction but it is not strong enough to deter the girl from enrolling (scenario ii). If $c_p > I_g$ and $I_b < X$, the boy would not sanction and

the girl would enroll (scenario iii). If $I_i > X$, the girl has internalized the norm so strongly that she always chooses to stay home regardless of the boy's incentives (scenario iv). Large education gender gaps in Sub-Saharan African countries suggest that either scenario i or iv is occurring. It is not important that the figure provides more than one possible equilibrium because as a typical social norm suggests, internalization and social sanctioning need not apply equally to every agent for the norm to influence aggregate societal outcomes. For those who have fully internalized that girls should stay in the home, scenario iv occurs. For those who are influenced by social sanctions, scenario i occurs. Regardless, girls do not enroll and gender inequality in education persists.

To better understand the role of social sanctions and internalized norms, it is critical to provide a brief background on the origins and influences of power in communities with large education gender gaps. This essay defines power as the ability of an individual to influence another to take an action that they would not otherwise do, via the use of sanctions[6] or manipulation (Ferguson, 2013, p. 66). Pertaining to gender inequality in education, a male-dominant society executes power over girls by influencing them to stay at home rather than pursue a more rewarding education. As described by Ferguson (2013, pp. 69-73), power can be embodied in three distinct domains: 1) behavior, 2) rules and expectations, and 3) manipulation of inclinations, preferences, and beliefs. Utilizing well-understood and observable sanctions, a player with access to the sources of power[7] can influence the outcome of the situation. As described by Basu (2000), straightforward sanctions (Power1) can be considered either condign power (winning submission through a threat of punishment) or compensatory power (submission through offering rewards) (p. 134). A male-dominant society uses condign power through the use of social sanctions—shunning, disapproval, etc.—if a girl or her parents enroll her in school (Power1) and the threat of social sanctions (Power2).

The third domain of power, beliefs and preferences, also plays a pivotal role in the persistence of the education gender gap. As described by Ferguson, Power3 influences outcomes by altering either immediate preferences, conceptions of appropriateness of action, deep-seated beliefs concerning one's ability to influence, or beliefs concerning how to affect change (2013, p. 72). Internalization of a social norm suggests the use of Power3 for its ability to influence immediate preferences. When a girl identifies with her prescribed gender role, she feels some positive feedback for acting in such a way that reaffirms her identity. Thus, the patriarchal society has conditioned her to accept and even prefer her suboptimal outcome. This scenario can be considered an example of conditioned power, when "the oppressed are so habituated to their situation that they are unaware of being oppressed" (Basu, 2000, p. 134). Ultimately, the typical social norm that perpetuates gender inequality in education relies on male-dominant society's use of Power1 (social sanctions), Power2 (threat of social sanction), and Power3 (manipulation of preferences to internalize oppressive gender roles).

Just as political economic theory can be applied to the micro foundations of gender inequality in education at the level of interaction between individual girls and boys, theory can provide a helpful framework for understanding the role that the family unit plays in perpetuating low female enrollment rates. This applied theory also provides valuable insight on the second-order CAP surrounding the education gender gap, namely families disregarding any formal legislation on gender equality in school enrollment.

Consider a societal structure where families presume that when their daughter gets married she becomes a member of her husband's household and all income she earns goes toward her husband's family's household. Conversely, when the family's son gets married his wife becomes a member of their household and all income she earns goes toward their own family. If both families invest the money to educate their daughters, both will realize larger household incomes in the future when their children are married and their educated daughters earn more money than they would have otherwise. Evidently, the future household incomes of families with both daughters and sons are interdependent because the birth family's investment in female education affects the family that the girl marries into. Ferguson's (2013) two-player strategic reciprocity model[8] can provide valuable insight on this scenario. Consider the following utility function for a family:

$$u_i = -c_i + \alpha \sum_{j=1}^{N} c_j + z_s\beta - z_o\psi$$

In the above equation c represents the cost of contribution or in this case the cost of educating the daughter. The second term represents the marginal return from contribution with the assumption that $\alpha<1$[9]. z_s is

the proportion of families who take the same action as family i, while z_o is the proportion of families who take the opposite action. $z_s\beta$ is the positive feeling from acting in a reciprocal manner, that is either both contributing (investing in daughter's education) or both defecting (not investing). $z_o\psi$ is the negative feeling realized from non-reciprocal actions.

Refer to Figure 3 for a representation of two-player simultaneous[10] strategic reciprocity. So long as $\beta + \psi \geq c(1-\alpha)$, there is a game of assurance with Nash equilibria where either both families invest or both families do not invest. Since female education has not historically been the common practice, a family will have little trust in their opponent's credibility in cooperating and educating their own daughter. Thus, where gender inequality in education persists, it can be argued that the currently realized Nash equilibrium is the suboptimal outcome where both families do not invest. It is critical to note that this is just one interpretation for how reciprocity can inform a family's choice to allocate funds for their daughter's education. It can be argued that some families might be motivated to punish others, via social sanctioning, who do not educate their daughters or would experience shame and/or guilt if they did not educate their daughter. There is clearly vast variation between different families situated in different cultures at different points it time, and the role of reciprocity certainly informs their payoffs and choices in different ways.

Figure 3.

		Family B	
		Invest	**Don't Invest**
Family A	**Invest**	$(2\alpha-1)c+\beta, (2\alpha-1)c+\beta$	$(\alpha-1)c-\psi, \alpha c-\psi$
	Don't Invest	$\alpha c-\psi, (\alpha-1)c-\psi$	β, β

Applying political economic theory to the societal problem of gender inequality in education demonstrates that social norms—of varying degrees of societal embeddedness, in different parts of the world and different points in time—perpetuate gender roles designating girls to remain in the home and boys to pursue education. The male-dominant society utilizes different sources of power to impose or threaten social sanctions for deviating behaviors and even alter individuals' preferences to abide by the status quo despite the socially optimal outcome would be gender parity in education. This framework can illustrate how to address the problem and move towards positive change. First however, an analysis of real-world data will determine whether or not political economic theory in fact correctly represents the issues and forces at play.

DATA AND EMPIRICAL ANALYSIS

As discussed in the background section of this paper, there has been ample research examining the driving factors of the persisting gender gap in education. While previous studies assert that culture, religion, and more specifically Islam have negative effects on female educational attainment in relation to the attainment of their male counterparts, little work has been done to distinguish between the effect of broad religious practices and the effect of specific oppressive social norms. This paper aims to isolate the effects of a society's social norms regarding the rights and responsibilities of women from other societal characteristics—most purposely from the prevalence of Islam in a country.

Using panel data from the World Bank, World Values Survey, Pew Research Center, and Economist Intelligence Unit, this paper will examine the effect of social norms on gender parity in education—holding constant influential variables such as urban population, gross domestic product per capita, unemployment rate, and prevalence of Islam. Refer to Table 1 for a complete list of this study's independent variables, their designated symbols for the regression equations, and brief explanations for how each was calculated.

Table 1.

STATISTIC	SYMBOL	CALCULATION
Education Gender Parity Index	GPI	# of girls enrolled in primary and secondary school for every boy enrolled
Social Norm Agreement	SN	% of those surveyed that agree with statement on men's right to scarce jobs
Urban Population (% of total)	UP	Urban population as a percentage of total population
GDP per capita	G	GDP divided by total population
Unemployment Rate	UE	Percentage of labor force that is unemployed but actively seeking employment and willing to work
Muslim-dominant country	M	Dummy variable; if Muslim percentage of total population >/= 70
Democracy	D	Dummy variable; if country scores >/= 6.0 on Democracy Index
African country	A	Dummy variable; if country is within African continent

The World Bank's gender parity index for primary and secondary school enrollment will be employed as a proxy for gender equality in education and thus serve as the

dependent variable. As presented in the basic regression model below, this paper proposes that the gender parity index is a function of the strength of traditional social norms regarding the rights and responsibilities of women, urban population as a percentage of total population, GDP per capita, and unemployment rate—with dummy variables in place to account for the basic differences between Muslim-dominant countries, democratic countries, and African countries:

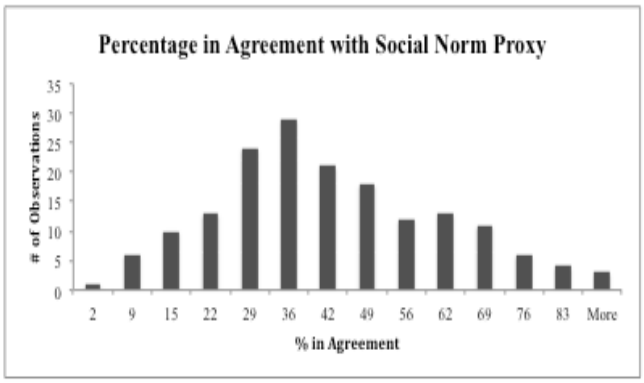
$$GPI_{it} = \beta_0 + \beta_1(SN_{it}) + \beta_3(UP_{it}) + \beta_4(G_{it}) + \beta_5(UE_{it}) + \beta_6(M_{it}) + \beta_7(D_{it}) + \beta_8(A_{it}) + \varepsilon_{it}$$

The regression will employ panel data; more specifically a singular observation is one country in a specific year. The dataset includes 144 observations spanning 78 countries over four years. The years observed align with the waves of the World Values Survey—1994, 1999, 2004, and 2014. Before analyzing the outcomes from this regression, it is critical to first establish a basic rationale for why each variable is included, how each is measured, and what predicted relationship each will have with the dependent variable.

First, to consider the independent variable of foremost interest in the study: social norms. While there is no agreed upon measure for the pervasiveness of social norms in different countries, the World Values Survey (WVS) examines various aspects of societies' values and beliefs that provide valuable insight on the perception of gender roles and gender equality. One such WVS survey question employed over four waves of the global research project is the agree/disagree statement, "When jobs are scarce, men should have more right to a job than women." While this is an imperfect measure of social norms regarding a woman's role in a society, the statement serves as an effective proxy. If oppressive social norms influence families to value the education of their sons greater than that of their daughters, it is reasonable to expect that within the same society people would value the employment of men greater than the employment of women. Thus, countries that show strong levels of agreement with the statement "When jobs are scarce, men should have more right to a job than women" would be expected to show strong levels of agreement with the traditional social norms relevant to this study.

To better understand the WVS data for this social norms proxy, refer to Figure 4. The histogram presents the proportion of individuals surveyed in each country/year observation that agree with the statement about male entitlement to work when jobs are scarce. As the figure illustrates, the recorded magnitude of agreement ranges from 2 percent (Sweden in 2014) to nearly 90 percent (Egypt in 2004) with a median level of agreement at 37 percent. With regard to the regression model presented above, this paper predicts that agreement with traditional social norms will have an inverse relationship with the education gender parity index.

Figure 4.



The next three independent variables—urban population, GDP per capita, and unemployment rate—have their data sourced from the World Bank. As summarized in Table 2, urban population (as a percentage of total population) and GDP per capita are both predicted to have positive relationships with education gender parity. As a country becomes more urban, it will become easier for the average girl to attend school because her commute is shorter and she likely has fewer household chores to balance her education with than she would in a rural household. As a country's GDP per capita increases, the average household's ability to allocate funding to their children's education increases. Conversely, unemployment rate is predicted to have an inverse relationship with education gender parity. This variable serves two purposes: to account for 1) noise created by the social norms proxy that frames gender equality in terms of job scarcity and 2) the demand of chores the average child must complete to contribute to their household's income in the informal economy—if their parents cannot find employment and must instead resort to subsistence farming or other informal work.

Table 2.

VARIABLE	+/-	JUSTIFICATION
Education Gender Parity Index	DV	Dependent variable.
Social Norm Agreement	-	The more prevalent the social norm, the less accessible education will be for girls.
Urban Population (% of total)	+	The more urban a country is, the easier it is for children (especially girls) to commute to school and they have fewer household chores.
GDP per capita	+	The wealthier the average family, the more funding they can allocate toward their children's education regardless of gender.
Unemployment Rate	-	The higher the unemployment rate, the more chores the average child will have to contribute to their household's income in the informal economy; accounts for noise that might occur in social norm proxy because variable pertains to job scarcity.
Muslim-dominant country	-	The more prevalent Islam is, the more internalized traditional social norms will be. Predicted to be less significant that social norms proxy variable.
Democracy	+	Democratic countries will have more gender equality, including in education.
African country	-	African countries lag behind other regions in education enrollment and more specifically female education enrollment.

The regression includes three dummy variables: Muslim-dominant country, democratic country, and African country. Countries were classified as Muslim-dominant if the Muslim population was greater than or equal to 70 percent of the total population, as reported by Pew Research Center (2011). As supported by previous research, the dominance of Islam is predicted to have an inverse relationship with education gender parity. However, this paper predicts that the social norms proxy variable will have a more significant inverse relationship with the dependent variable than the Muslim-dominant dummy variable. The second dummy variable, democratic country, was applied to all observations that scored 6.0 or above on the Economist Intelligence Unit's Democracy Index[11]. Democratic countries are predicted to have greater gender parity in education because democracy facilitates equality in many different realms. The third dummy variable, African country, was straightforwardly applied to all countries located on the African continent. As Klasen (2002) and other previous research asserts, African countries do not always follow neatly with trends observed in other regions. Thus, it is best to proactively account for quirks that may differentiate this region. The African country variable is predicted to have an inverse relationship with education gender parity because the region has historically lagged behind other developing areas in education gender equality. Table 3 provides descriptive data for the eight variables introduced in Table 1.

Table 3.

VARIABLE	N	MEAN	SD	MIN	MAX
Education Gender Parity Index	144	0.99	0.06	0.74	1.15
In Agreement with Norm (%)	144	39.35	19.20	2.00	89.60
Urban Population (% of Total)	144	64.74	19.92	12.76	100.00
GDP per capita	144	10516.31	15035.07	161.01	96732.53
Unemployment Rate (% of Labor Force)	144	9.66	6.48	0.90	37.20
African Country	144	Dummy		0	1
Muslim-Dominant Country	144	Dummy		0	1
Democratic Country	144	Dummy		0	1

After establishing a firm understanding of each variable included and rationalizing predictions for how each relates to the education gender parity index, it is appropriate to test this paper's hypothesis by running a regression and analyzing results. The first two regressions tested are ordinary least squares (OLS) models. Both include all seven of the independent variables presented above, but the second regression also includes dummy variables for the years 1999, 2004, and 2014 (1994 serves as the base year). The coefficients for the year dummy variables are all expected to be positive because gender parity is expected to improve over time. Both regressions adapt GDP per capita by taking the natural log of the variable to make the regression coefficient more meaningful and generalizable—showing proportional change rather than a simple dollar amount. Refer to the following equations for the OLS models tested, Regression 2 including additional dummy variables for years.

Regression 1:

$$GPI_{it} = \beta_0 + \beta_1(SN_{it}) + \beta_3(UP_{it}) + \beta_4(\ln(G_{it})) + \beta_5(UE_{it}) + \beta_6(M_{it}) + \beta_7(D_{it}) + \beta_8(A_{it}) + \varepsilon_{it}$$

Regression 2:

$$GPI_{it} = \beta_0 + \beta_1(SN_{it}) + \beta_3(UP_{it}) + \beta_4(\ln(G_{it})) + \beta_5(UE_{it}) + \beta_6(M_{it}) + \beta_7(D_{it}) + \beta_8(A_{it}) + \beta_9(Y_{it}^{1999}) + \beta_{10}(Y_{it}^{2004}) + \beta_{11}(Y_{it}^{2014}) + \varepsilon_{it}$$

Refer to Table 4 for regression coefficients and p-values for OLS models Regression 1 and Regression 2. For an interpretation of the statistically significant coefficients in Regression 1, a 10 percent increase in the number of people in agreement with the social norm corresponds with a reduction in the gender parity index by 0.0119. That is, an increase of 10 percent more people agreeing with the social norm aligns with 1.19 fewer girls enrolled in school per 100 boys in school. This is

significant at the 1 percent level. With regard to urban population, a 10 percent increase in urban population as a percentage of total population corresponds with an increase in the gender parity index by 0.01—or exactly one additional girl enrolled in school per 100 boys. This is also significant at the 1 percent level.

Table 4.

	(3) Education Gender Parity Index
In Agreement with Norm (%)	0.00189
	(1.98)
Urban Population (% of Total)	0.00334*
	(2.29)
Unemployment Rate (% of Labor Force)	0.000890
	(0.65)
Log of GDP per Capita	-0.0147
	(-1.60)
Year=1999	0.0182
	(1.46)
Year=2004	0.0235
	(1.07)
Year=2014	0.0505
	(1.32)
Constant	0.786***
	(7.08)
Observations	144
Adjusted R^2	0.314

t statistics in parentheses
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

In Regression 2, the same two independent variables prove to be significant in addition to the dummy variable for 2014. A 10 percent increase in the number of people in agreement with the social norm proxy corresponds with a reduction in the gender parity index by 0.00993, or just shy of 1 less girl enrolled in school per 100 boys. This is significant at the 5 percent level. A 10 percent increase in urban population as a percentage of total population corresponds with an increase in the gender parity index by .0105—or 1.05 additional girls per 100 boys. This is significant at the 1 percent level. The dummy variable for 2014 suggests an increase of 0.0402 in the gender parity index since the base year of 1994. This suggests that 4 more girls are enrolled in school per 100 boys in 2014 compared to in 1994. This is significant at the 5 percent level.

For the three independent variables that showed significance in Regressions 1 and 2, their coefficient signs are all as were predicted. The statistical significance for the social norms proxy—and the simultaneous lack of statistical significance for the Muslim-dominant country dummy variable—supports this paper's hypothesis. Perhaps the previous research that asserts Islam to correspond with lower female educational attainment was picking up traditional social norms oppressive toward women that often overlap with the Muslim religion but are by no means representative of the entire religious community in all of its iterations. As this panel dataset illustrates, there is a 0.64 correlation coefficient between Muslim-dominant country and social norm agreement. While this is a positive correlation, there is not a strong enough relationship to suggest that the two are indivisible. With regard to the remaining independent variables in both Regressions 1 and 2, it is not overly concerning that some of their coefficient signs are not as were predicted because they were not statistically significant.

This paper assumes that the classical assumptions are met for the above OLS models. A basic analysis of the correlation coefficients between the independent variables suggests that there is not multicollinearity. The OLS models are most likely not affected by reverse causality; for instance, gender parity index does not affect urban population or GDP per capita (at least not within the same period). While there are no outright problems with the two regressions above, it is evident by the low R^2 value that the OLS model is not fully capturing external factors influencing the gender parity index. Thus, a more econometrically advanced regression model can offer much needed control over external influencers. While the OLS models do support this paper's hypothesis, Regression 3 engages a fixed effects model to better analyze the true relationships between the dependent and independent variables.

Regression 3:

$$\theta GPI_{it} = \beta_0 + \beta_1(\theta SN_{it}) + \beta_3(\theta UP_{it}) + \beta_4(\theta G_{it}) + \beta_5(\theta UE_{it}) + \beta_6(\theta M_{it}) + \beta_7(\theta D_{it}) + \beta_8(\theta A_{it}) + \theta\varepsilon_{it}$$

Regression 3 employs the same seven independent variables, with θ representing the mean of the variable subtracted from the unique observation, i.e. $SN_{it}-\overline{SN}_i$. There are not explicit dummy variables for different years because the fixed effects model will automatically compare observations by year. Refer to Table 5 for coefficient and

p-value results for the fixed effects model. Unlike the OLS models, Regression 3 only shows statistical significance for urban population as a percentage of total population. A 10 percent increase in urban population as a percentage of total population corresponds with a 0.0334 increase in the gender parity index, or an additional 3.34 girls enrolled per 100 boys. This is significant at the 5 percent level. Thus, the fixed effects model does not support the hypothesis that strong agreement with the social norm proxy regarding the rights and responsibilities of women corresponds with greater gender inequality in school enrollment.

Table 5.

	(3) Education Gender Parity Index
In Agreement with Norm (%)	0.00189
	(1.98)
Urban Population (% of Total)	0.00334*
	(2.29)
Unemployment Rate (% of Labor Force)	0.000890
	(0.65)
Log of GDP per Capita	-0.0147
	(-1.60)
Year=1999	0.0182
	(1.46)
Year=2004	0.0235
	(1.07)
Year=2014	0.0505
	(1.32)
Constant	0.786***
	(7.08)
Observations	144
Adjusted R^2	0.314

{ statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

While panel data can be vulnerable to multicollinearity and heteroskedasticity, the fixed effects model utilized robust standard errors to help control for heteroskedasticity. Moreover, a basic analysis of the correlation coefficients between the independent variables suggests that there is not multicollinearity considering the strongest coefficient in 0.644. However, it is also critical to note that the dataset of only 144 observations is rather small to extrapolate results from. Moreover, the dataset did not include key observations for Sub-Saharan African countries with low gender parity indices where these results would be most informative.

CONCLUSION

Gender inequality in education is an undeniably complex problem with severe consequences for human development and the economy. Previous economic literature has thoroughly documented both the benefits of maternal education for the next generation as well as the current economic growth possible with a better-educated workforce. While the gender gap has closed in many countries, even reversing in some instances, Sub-Saharan Africa still lags behind other developing regions in this metric. Many scholars have studied the causes of low female educational attainment, and their findings consistently attribute the gender inequality to the prevalence of Islam in a society.

This paper engages ideas and frameworks from political economic theory to propose an alternative explanation. Social norms that support oppressively limited rights and responsibilities of women truly underlie the first-order CAP of a persisting education gender gap. While these norms often overlap with Muslim communities, they are not one and the same. At one point in time female education may not have even been considered, what is called a rationality-limiting social norm in political economy. Conversely, in countries where there are currently more girls than boys enrolled in school, this norm has clearly been completely phased out. Perhaps its antithesis of equal education for boys and girls has become its own rationality-limiting norm. For countries where a gender gap still persists, like in Sub-Saharan Africa, this paper proposes that a typical social norm is in effect. However, with the passage of time and globalization, the norm may slide along the spectrum presented in Figure 1. The employment of an additional political economic concept provides a better understanding of the second-order CAPs surrounding the education gender gap; strategic reciprocity illustrates how the incentives of families choosing to allocate funds toward their children's education can be altered.

An empirical analysis of panel data tests the hypothesis that agreement with social norms supportive of traditional roles for women has a statistically significant inverse relationship with gender parity in school enrollment. While the OLS models employed find statistical significance for the social norms proxy, urban population as a percentage of total population, and the 2014 year dummy variable, the low R^2 value suggests that there are external factors that are not fully controlled for. Introducing a fixed effects model to better control for external factors, the only remaining statistically significant variable is urban population. While these results do not

support this paper's hypothesis, they most likely do a better job of capturing the variables' true effects. However, it is critical not to overlook the fact that the dataset is small and omits key Sub-Saharan African countries of interest.

Notes

1. Second-order CAPs are problems of orchestrating the coordination and enforcement needed to render agreements for resolving first-order CAPs credible (Ferguson, 2013, p. 5).
2. Gender parity in education, rather than full female enrollment, will serve as the socially optimal outcome because at least boys and girls of the same aptitude would have the same opportunity to pursue an education. For both genders, reaching full enrollment is difficult for reasons outside of gender equality—such as rural location.
3. A rationality-limiting norm is a behavioral regularity within a group that is so strong that alternatives to its prescription are not even considered. Social sanction is not necessary because the ethical message of the norm is so deeply internalized (Ferguson, 2013, p. 167-169).
4. As described by Ferguson (2013), a coordinating convention is a "shared, expected, and ethically neutral behavioral regularity observed among the members of some group that, once established, is self-enforcing without recourse to sanctions or internalized sentiments" (p. 168).
5. Negative identity externalities include both individual and group discomfort or conflict that results from the activities of an individual that challenge the preexisting identity concepts of those they interact with as well as the internalized norms.
6. Sanctions include both punishments and rewards contingent upon the behavior of a player.
7. The sources of power include position, access to resources, and an ability to resolve CAPs associated with mobilizing support (Ferguson, 2013, p. 69).
8. This paper makes the assumption that families are reciprocal players employing strategic reciprocity. That is, their payoffs do not solely depend on the material payoffs of the game but also depend on some internal benefit realized when they behave reciprocally or some internal loss realized when they do not behave reciprocally.
9. α is assumed to be less than 1, although in this scenario it might be quite close to 1, because the average family would not receive more than the amount they invested in their daughter's education.
10. This paper assumes that this game is simultaneous because when a family is choosing whether or not to invest in their daughter's education they do not know if their future daughter-in-law will be educated, i.e. not sequential.
11. Scores range from 0 to 10; index is based on 60 indicators assessing pluralism, civil liberties, and political culture.

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