

Religion and Female Education: Trans-Megabloc Effects

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Abstract: *This paper examines the link between trans-megabloc Christian groups and female education—both the attainment levels and the education gender gap—using the Barro-Lee education dataset for a sample of 97 countries. The term trans-megabloc (Barrett, Kurian and Johnson, 2001) refers to groups that are defined by a set of beliefs/behaviors that transcend Christian denominations or the categories of Catholic, Protestant, and Orthodox Christians. The three trans-megabloc groups are evangelicals, great commission Christians, and Pentecostal/charismatics. Other control variables are urbanization, tropics, colonial heritage, female labor force participation, and young adult mortality. Results show that increases in the percentage of trans-megabloc Christians decrease the proportion of unschooled population and increase the proportion of women who attain higher education. The greater the proportion of trans-megabloc Christians in a country's population, the smaller the education gender gap for both unschooled and higher educational attainment. In no case for trans-megabloc religious groupings do we find significant bias against female edu-*

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ational attainment in an absolute sense or relative to male educational attainment. When other religions are included in regression estimates, the favorable trans-megabloc effects are muted and less statistically significant. In contrast, the negative effects of other religions are robust and nearly uniform for both female educational attainment and the female/male gender gap. JEL Codes: I24, I25, J16, O15, Z12. Keywords: female education, educational attainment, education gender gap, religion, Christianity, trans-megabloc.

This paper explores the effect of religion on female education attainment and the educational gender gap between females and males using country-level data with emphasis on Christian adherents. The focus of the paper is on hybrid Christian groups rather than the standard approach using Catholic, Orthodox, and Protestant categories. The categories used are known as trans-megabloc groups. These trans-sectarian Christian religious bodies have particular relevance in 20th- and 21st-century Christian religion. The groups in some sense are viewed as more theologically conservative than traditional or mainline Christian categories. More precisely, these groups are more active and more committed to various tenets of the Christian faith and worship, and are particularly committed to some form of evangelism or church growth.

These groups are derived from Barrett, Kurian, and Johnson, *World Christian Encyclopedia* (2001), a standard source for cross national empirical research on religious behavior. The trans-megabloc categories evangelical, great commission, and charismatic/ Pentecostal are used. These groups are generally taken as aggregations of traditional Protestant, Orthodox, or Roman Catholic groups. The groups rely on slightly different definitions but they are not mutually exclusive. Accordingly, a person could simultaneously be an evangelical and charismatic/Pentecostal.

1 Background

Economic productivity is an important determinant for economic growth, as noted by Adam Smith, in his *Wealth of Nations* (1776, p. 1), who defined productivity as “the skill, dexterity and judgment with which its labor is generally applied.” Therefore, an important determinant of economic growth and economic productivity is the human capital stock of

a society, of which one measure is the educational attainment level of a society's labor force. Indeed, some contemporary scholars, e.g. Glaeser, *et al.* (2004), argue that human capital investment, not just favorable economic institutions, is a powerful complementary source of economic growth.

Educational attainment levels vary by gender, and countries show substantial differences between female and male educational attainment, for which Todaro (1997) coined the phrase "educational gender gap." Yet female education is an important determinant of economic growth and human well-being, as a number of studies document a negative relationship between gender education inequality and economic growth (Klasen & Lamanna, 2009). In fact, investing in female education is the most important way to increase the well-being of the world's poor (Summers, 1992), in addition to increasing the stock of children's human capital (Behrman, Foster, Rosenzweig, & Vashishtha, 1999). Globalization is associated with economic growth, and thus factors such as educational attainment that link to economic growth are inherently global. More to the point, religious variables are also among the prominent forces in globalization in the past century. For example, Africa has faced tremendous shifts in adherence to different religious groups. According to Barrett, Kurian, and Johnson (2001), in 1900, Africa was 9.2 percent Christian, and 58.2 percent ethnoreligious. By 1995, Africa was 45 percent Christian, and 12.9 percent ethnoreligious.

Religion can affect overall educational attainment in a society, as well as gender differences in education. In many countries, religious codes and institutionalized authority structures often support normative beliefs in the value of large families that result in gender role differentiation and an increased educational gender gap (Malik, 1995). The economics of religion literature relies largely on ad hoc treatments of large religious bodies in augmented Solow growth model regression equations, or regressions addressing the quality of government and the determinants of democracy. In recent years, there has been a surge of research documenting the role of religious adherents in determining the quality of government, economic growth, and the extent of democracy across countries (Barro, 1999a, 1999b; Barro & McCleary, 2003; La Porta, Lopez-de-Salinas, Shleifer & Vishny, 1997). Religion can also profoundly affect educational attainment, particularly for females (Norton & Tomal, 2009; Cooray & Potrafke, 2011).

Researchers have obscured distinctions within religions; the number of religions is narrow and restricted, and important developments in world religions have been ignored. For example, the proportion of people in groups that cut across religious denominations is especially noteworthy. For example, in 1900, the world was 1.5 percent Evangelicals and 0.8 percent charismatics; by 1995, evangelicals were 8.8 percent of the world's population, and charismatics were 15.9 percent. In Brazil alone, the percentage of charismatics grew from zero percent in 1900 to 46.6 percent in 1995. It seems unlikely that these developments have zero effect on fundamental economic forces such as investment in human capital and economic growth.

The concept of trans-megabloc Christians has its genesis in Barrett, Kurian, and Johnson (2001) and Barrett and Johnson (2001) and has not been used heretofore in any academic empirical analysis. Trans-megabloc Christians is a term that identifies groups with a set of beliefs/behaviors that transcend specific Christian denominations. Trans-megabloc Christians are comprised of three categories—evangelicals, great commission Christians, and charismatics/Pentecostals/neo-charismatics—which replace the traditional Christian groups and, in fact, provide overlap among the traditional groups.

1.1 Christians and classifications

Christians comprised the world's largest religious group in 2001 with 33 percent of the world's population, compared to Muslims (19.6 percent), Hindus (13.4 percent), and Buddhists (5.9 percent) (Barrett & Johnson, 2001). In 2000, there were 312 Christian ecclesiastical traditions, 100 major Christian world confessions, 33,800 denominations, 2.0 billion Christians, 1.9 billion affiliated church members, and 650 million practicing Christians (Barrett & Johnson, 2001). The largest group of affiliated Christians was Roman Catholic (1.1 billion, or 17.5 percent of the world population); the other Christian groups were six percent or less of world population. Virtually all the Christians were "professing Christians" (31.2 percent, compared to 33 percent), and almost all professing Christians were also affiliated Christians.

Christianity is often divided into three major groups—Catholic, Orthodox, and Protestant. Other categories of Christians, however, exist. The Center for the Study of Global Christianity, for example, defines a Christian megabloc as one of six major ecclesiastic-cultural groups—

Anglican, Catholic, Independent, Marginal, Orthodox, and Protestant. Because belief systems and worldviews often transcend Christian denominations, the term trans-megabloc Christians was formulated by Barrett, Kurian, and Johnson (2001). A trans-megabloc Christian group is a grouping of Christians sharing certain common central beliefs that transcend historic confessional bounds (megablocs). The three trans-mega bloc groupings defined by Barrett *et al.* are evangelicals (3.5 percent of the world's population in 2000), charismatics/Pentecostals/neo-charismatics (8.7 percent), and great commission Christians (10.7 percent). These three groups cut across all megabloc denominational lines—Orthodox, Catholic, Anglican, Protestant, Marginal, and Independent. In addition, there is overlap between the three trans-megabloc groups.

All people classified as great commission, evangelical, or Pentecostal/charismatic are Christians, but not all Christians would belong to any of these three trans-megabloc groups. The *Great Commission* is the term given to Jesus' command to pronounce his teachings to the world. The term *evangelical* has its etymological roots in the Greek word for “gospel” or “good news;” evangelical Christians emphasize being *born again*, the authority of the Bible, and mission outreach (Bebbington, 1989). *Charismatics/Pentecostals* believe in baptism with the Holy Spirit as an experience separate from conversion.

The largest trans-megabloc group—great commission Christians—is practicing Christians of evangelical conviction who are affiliated with a church and who are active in mission (evangelizing, whether covertly or overtly). Great commission Christians are found in each of the six megablocs (Anglican, Catholic, Independent, Marginal, Orthodox, and Protestant), although the percentage in each varies greatly. Great commission Christians number 648 million people and were 95 percent of all Christians in AD 33, only 4 percent in the year 1500, and 32.4 percent in 2000.

The smallest group—evangelicals—are defined as “all church members of any confession who identify themselves as evangelicals and/or who belong to churches or denominations which are affiliated with one or more of the specifically evangelical councils or alliances or other core agencies” (Barrett & Johnson, 2001, p. 27) and are “characterized by commitment to personal religion” (Barrett, Kurian, & Johnson, 2001, Vol. I, p. 28). Evangelicals comprise 10.5 percent of all Christians and include eight categories: Conservative (83 million), Neo-Evangelicals (34 million), Anglican (30 million) Protestant (27 million), Independent (27

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million), Catholic (7.8 million), Orthodox (2 million), and Liberal (0.2 million). Of the evangelicals, almost one-third (211million) would also be classified as great commission Christians.

The third group—charismatics/Pentecostals/neo-charismatics—constituted 8.7 percent of the world population in 2000 (524 million), with some overlap between the groups: neo-charismatics (295 million), charismatics (176 million), and Pentecostals (66 million). This grouping constitutes 26.2 percent of all Christians and 80 percent of great commission Christians; many people classified as evangelical are also part of this trans-megabloc group. Barrett, Kurian, and Johnson (2001) obtain their data from the world's 33,800 denominations and 4,000 great commission mission agencies through the annual surveys that these denominations and agencies “instruct some 10 million Christian leaders to fill out and return . . . listing and enumerating the year's work and progress” (Barrett & Johnson, 2001, p. 450). The authors acknowledge that “perhaps 90 percent of all the statistics may be said to be reasonably accurate, though all have their margins of error” (Barrett and Johnson, 2001, p. xiii). Draulans and Halman (2005), in their concluding remarks on their research on Europe's religious pluralism, encourage the use of the trans-megabloc groupings in future research on Europe; presumably, these groupings would be relevant for any research exploring religion.

1.2 Gender, education, and economic growth

Research on female education generally focuses on two issues: (1) determinants of female education and (2) determinants of the education gender gap (educational investment of females relative to males). Barro and Sala-I-Martin (1995) contend that the gender gap is attributable to a generalized “backwardness,” so that part of the cross-country differences in the gender gap can be explained by the level of economic growth and development. Public education was not prevalent anywhere in the world until the 1600s, and not until later in the twentieth century did education begin to spread throughout Africa (Mitch, 2005).

Psacharopoulos (1994) finds that primary education is the most important investment in developing countries and that female education generally shows a higher return than that for men. In developed, high-income countries, education levels are nearly equal between males and females (Topel, 1997). Not only do these countries have extensive public education, but rates of return on educational investment rise as

birth rates decline, wage rates rise, and more married women enter the labor force (Becker, Murphy, & Tamura, 1990). The gender gap generally declines with economic growth because of opportunities created by expanding markets (Charles, 1992; Clark, Ramsbey, & Adler, 1991). Hill and King (1993) find that large education gender gaps appear to reduce GNP.

The global primary completion rate for girls has increased but still lags that of boys—76 percent to 85 percent (Barro & Lee, 2010). However, the gap has decreased in some countries not because of increases in girls' completion rates, but because of declines in boys' completion rates. The overall female primary level enrollment in low-income countries has increased from 87 percent in 1990 to 94 percent in 2004 (Tembon, 2008). Secondary enrollment rates range from 101 percent in high-income countries to 54 percent in low-income countries (over-reporting and grade repetition can result in percentages over 100), with a low of 30 percent in sub-Saharan Africa (Glewwe & Miguel, 2012).

The education gender gap in developing countries has improved over the last 60 years. Although high-income countries have virtually no gender gap for either primary or secondary education, low-income countries show gender gaps for both primary and secondary education, with a larger gap for secondary education. The ratio of female to male average years of schooling increased from 57.7 percent in 1950 to 85.9 percent in 2010, although the attainment level and gender gap in developing countries is similar to developed countries in the late 1960s (Barr & Lee, 2010). However, while almost all countries (85 percent) show improvement in their education gender gaps since 2005, the gender gap is increasing in several African and South American countries (Hausmann, Tyson, & Zaidi, 2011).

1.3 Religion, education, and economic growth

To the extent that religion enhances or retards investment in education, religion, therefore, plays a role in economic growth. Max Weber (1930) is noted for linking religion and economic growth, when he asserted that the Protestant Reformation was the primary cause of economic development through the growth of capitalism. Becker and Woesmann (2009) also find a link between economic growth and Protestantism by claiming that economic development was enhanced by literacy attained through reading the Bible. Glaeser and Glendon (1996) find a stronger relationship between economic growth rates and religiosity among Protestant countries than among Catholic countries, at least before 1950; they pos-

tulate that Protestant countries more readily adopted capitalism than did Catholic countries. Other researchers have also found a negative relationship between Catholicism and economic growth (Harrison, 1985). Morse (1964) claims that the Hispano-Catholic tradition is less conducive to economic growth than Protestantism because of the latter's adherence to the virtues of hard work and savings, which then provides funds for capital investment.

Other scholars vigorously oppose the Weberian tradition. Samuelson (1993) claims that economic progress is unrelated to religion, that nearly all the capitalist institutions preceded the Protestant Reformation, and that merchants and industrialists may have favored Protestantism because it offered more freedom and a more convenient secular lifestyle than Catholicism. Delacroix (1995) finds no difference between religious groups when comparing levels of economic development between European Protestant and Catholic countries. Linking religion indirectly to economic growth, Grier (1999) reports that education levels at the time of independence explain much of the development gap between former British (predominantly Protestant) and French African (primarily Catholic) colonies. Newly independent African British colonies were more educated than the French colonies, primarily because of differences in educational philosophies between the British and the French. The British taught in the vernacular languages and trained indigenous teachers, whereas most of the teachers in the French colonies came from France, students were required to speak French, and education was primarily through boarding schools, a luxury that few French Africans could afford.

Religion and education can also be related to economic growth through a country's democracy level (Lipset, 1994; Barro, 1999b). Barro finds that the "propensity for democracy," as measured by strength of electoral rights and civil liberties, rises with per capita GDP, primary schooling, and a smaller primary education gender attainment gap—and Protestant countries are generally more democratic than countries that are predominantly Catholic. More recently, however, Latin American countries (where Catholicism prevails) have slowly expanded their religious views by accepting beliefs that promote material wealth, such that Catholicism now is positively related to economic performance in all Latin American counties except Uruguay, which is predominantly Protestant (Ortiz, 2009).

Within the United States, religion also appears to be linked with eco-

conomic growth. Rupasingha and Chilton (2009) find that religious adherence negatively impacts county income growth. Keister (2011) finds that religious affiliation is linked with wealth and educational attainment, not only between Christian religious groups but also between Protestant groups. Conservative Protestants, for example, have lower educational attainment levels and significantly less wealth than mainline Protestants and Catholics.

Indeed, throughout history, religion and economics have been linked, as religion affects a country's values and practices, which directly or indirectly affect all levels of economic activity, including education. On the other hand, Martin (2006) argues that evangelicals and especially Pentecostals across the world undergo a change in heart that often leads to beneficial self-investment especially for females.

2 Data and Methodology

This study uses 1995 country-level data for the 97 countries for which education and religion data are available (Table A I). Barro and Lee (1993) developed a widely used education dataset which uses a perpetual inventory approach to estimate the number of school years completed for persons aged 15 and above and aged 25 and above; Barro and Lee have since created a website (2011) that extends their estimates from 1950 to 2010. While their measure does not adjust for important dimensions such as quality, the measure is a reasonable representation of a country's human capital stock. The limit of 15 years provides a better fit for the age levels for marginal decisions regarding further educational investment and fits more closely with the 1995 religion data (Barrett, Kurian, & Johnson, 2001) used as control variables.

2.1 Regression models

To examine potential determinants of educational attainment levels (both female and male) and of the gender gap (female attainment minus male attainment), two equations are estimated:

$$(1) \quad \log\text{-odds}(EA_i) = \beta_0 + \beta_1 R_i + \beta_2 C_{1i} + \dots + \beta_7 C_{6i} + \varepsilon_i$$

and

$$(2) \quad \log\text{-odds}(EA_{fi}) - \log\text{-odds}(EA_{mi}) = \beta_0 + \beta_1 R_i + \beta_2 C_{1i} + \dots + \beta_7 C_{6i} + \varepsilon_i$$

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where EA represents the respective measure of educational attainment in a nation, R represents the trans-megabloc religious variables or other world religions, and C represents the other control variables. Equation 1 represents the female educational attainment level, and Equation (2) represents the educational gender gap: the female attainment measures in Equation (1) minus the comparable male educational attainment measure.

2.2 Dependent variables

The Barro-Lee educational attainment data give the proportion in each country who have attained various levels of education, so that a low percentage for primary attainment, for example, may reflect education terminating after primary school, or the low percentage may mean that many women advance to secondary school. The data, therefore, are most meaningful for “unschooled” and “higher education attainment” and

Female Education Attainment	Mean	Std. Dev.	Minimum	Maximum
No Schooling	30.5	26.5	0.0	91.2
Example	Botswana ^a		Japan & New Zealand	Mali
Primary Attainment	35.2	14.3	6.9	69.6
Example	Netherlands ^b		Mali	Lesotho
Secondary Attainment	24.3	15.6	1.5	60.1
Example	Peru ^c		Niger	Norway
Higher Education Attainment	10.0	10.2	0.1	53.5
Example	Switzerland ^d		Mozambique	Canada

Data are for the population aged 15 and above. Example for means is an observation close to the sample mean. Minimum and maximum are extreme sample observations. a. 29.3; b. 35.3; c. 25.0; d. 10.2.

Table 1. Female Educational Attainment Levels (N=97)

show widely disparate female education attainment levels across the 97 countries.

Table 1 shows descriptive statistics on female educational attainment levels. The data show striking differences in both the attainment levels and the dispersion between countries. Of the 97 countries, Japan and New Zealand are the only countries in which all women have achieved some level of education. At the other extreme, Mali can be considered the worst country for female education. Mali has the maximum percentage of women with no schooling at all—91.2 percent—as well as the lowest percentage of women who have achieved at least primary school education—only 6.9 percent. Many women in other countries also have no formal education whatsoever; the average percent of unschooled women in the 97 countries is 30.5 percent. As expected, the percentages for female educational attainment levels decrease with level of schooling, from a country average of 35.2 percent of women with primary school education to 24.3 percent with secondary school attainment to only 10 percent of women with higher education. For all levels of educational attainment, however, the ranges are wide. For female primary school attainment, the country averages range from 6.9 percent (Mali) to 69.6 percent (Lesotho); for secondary school attainment, the range is from 1.5 percent (Niger) to 60.1 percent (Norway); and for higher education attainment, Mozambique is the lowest (0.10 percent), and Canada is the highest (53.5 percent).

Table 2 provides descriptive statistics on the educational gender gap, which reflect the absolute difference between female and male percentages for the educational attainment levels. Except for the unschooled measure, where positive values denote anti-female bias, negative values mean that the female percentage of educational attainment is less than the male percentage. Note that the range of the education gender gap is large for all the attainment levels. The gap is largest in Togo where 32.5 percent more females than males have no formal education. The averages for the other educational attainment levels are all negative, meaning that larger percentages of males have attained those levels than have females, reflecting systemic gender gaps. The average education gender gaps are close in value—between -2.4 and -3.6 percent. The minimum values show large gender gaps at all education levels. In Uganda, 27 percent more men than women have finished primary school. In Ghana, almost 23 percent more men than women have finished secondary school.

Gender Gap	Mean	Std. Dev.	Minimum	Maximum
Unschooling	8.6	10.5	-12.6	32.5
Example	Sri Lanka ^a		Lesotho	Togo
Primary Attainment	-2.4	8.3	-27.1	19.7
Example	Indonesia ^b		Uganda	Austria
Secondary Attainment	-3.6	6.5	-22.6	10.9
Example	Senegal ^c		Niger	Norway
Higher Education Attainment	-2.6	3.1	-17.2	3.4
Example	Malaysia ^d		Mozambique	Canada

Data are for the population aged 15 and above. Example for means is an observation close to the sample mean. Minimum and maximum are extreme sample observations. a. 8.7; b. -2.6; c. -3.5; d. -2.6.

Table 2. Educational Attainment Gender Gap: Female Level Minus Male Level (N=97)

In South Korea, 17 percent more men than women have achieved some higher education. In the Philippines, however, 3.4 percent more women than men have achieved higher education.

2.3 Independent variables

Trans-megabloc Adherents. Table 3 shows the percentages of various Christian groups for the top 25 sample countries. In 1995, the Pentecostal/charismatics and the great commission Christians had similar percentages of adherents. The top countries were 51.9 percent (South Africa) for Pentecostals/charismatics and 48.2 percent (Ireland) for great commission Christians. The top country for evangelicals was Rwanda (24.5 percent). All but one of the top ten Pentecostal/charismatic countries in 1995 was in Africa or South America. All top ten great commission countries were developed countries, with five countries in the top ten for both years. (In two sets of regressions, we also use the variable World

Religions, which measures the proportion of ethnoreligious, Hindu, and Muslim adherents.)

Our testable hypotheses regarding trans-megabloc coefficients allow a full range of possibilities. The alternative hypothesis could be positive for no schooling and negative for female attainment if the trans-megabloc adherents fit the 19th century American social ideal of domestic females and the males follow the corresponding machismo male subculture (Balmer, 1994; 1999). Alternatively, the alternative hypothesis could be negative for unschooled females and positive for female school attainment in both absolute and relative dimensions if trans-megabloc adherents encourage the orderly and transformational life documented by Martin (2006) in industrialized countries and especially in Latin America and Africa.

Control Variables. Table A2 provides data sources for all the variables, and Table A3 provides the descriptive statistics for the dependent and the control variables. The control variables reflect important themes in modern labor and growth economics. Accordingly, they merit some discussion.

Mortality. This variable is the logged percentage of a country's population not surviving to age 40 in 1990. In his model of fertility and human capital investment, Tamura (2006) finds that higher levels of young adult mortality decrease the incentive to invest in education. He also finds that rates of return to education are higher in countries with lower young adult mortality. In addition, increased levels of young adult mortality can reduce the incentive for investment in female education.

Colonization. Grier's (1997, 1999) analyses find that British colonies had more effective investment in education than French colonies at the time of independence but not generally post-independence. Critics of colonialism might argue that since colonial systems ignored the social infrastructure and were largely extractive, the absence of a colonial heritage might enhance investment in education. Our preliminary estimates suggested that the only consistently significant colonial effects were for the two dummy variables for British colonial heritage and for no colonial heritage; thus, the intercept captures the effects of all other colonial heritages.

Urbanization. Because investment in human capital is strongly linked to urbanization (Lucas, 1988), returns to education should be greater in urbanized areas, and attainment levels should be higher for both females and males.

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Rank	Country	Trans-megabloc	Country	Pentecostal/ Charismatics
1	Swaziland	90.3	So. Africa	51.9
2	So. Africa	81.9	Swaziland	51.4
3	Brazil	76.5	Brazil	46.6
4	USA	75.9	Zimbabwe	40.5
5	New Zeal.	72.3	Chile	36.2
6	Zimbabwe	69.7	DRC	34.2
7	Malta	66.3	Botswana	31.6
8	France	65.4	Columbia	29.5
9	UK	65.2	Kenya	27.2
10	Ireland	64.6	Norway	26.6
11	Kor. Rep.	62.7	USA	26.2
12	Canada	62.0	Philippines	26.1
13	Norway	61.9	Mauritius	25.4
14	Kenya	61.3	Malta	24.1
15	Australia	60.2	France	24.0
16	Rwanda	58.0	Grenada	23.4
17	Botswana	57.1	Argentina	22.6
18	Uganda	53.4	Uganda	22.2
19	Zambia	52.7	Rwanda	21.9
20	Chile	52.2	Fiji	21.7
21	Neth.	51.6	Guatemala	21.7
22	CAR	50.4	Ghana	21.7
23	DRC	50.0	Zambia	21.6
24	Jamaica	50.0	Congo Rep.	19.3
25	Italy	49.7	Haiti	18.0

Table 3 (continues on facing page). Top 25 Countries for Trans-megabloc Groups Ranked by Percentage of Population in 1995

Rank	Country	Evangelicals	Country	Great Commision
1	Rwanda	24.5	Ireland	48.2
2	Kenya	22.0	Belgium	45.6
3	UK	19.7	Spain	43.0
4	Kor. Rep.	19.1	Malta	42.1
5	Uganda	17.6	Italy	42.0
6	New Zeal.	17.6	Neth.	41.2
7	Papua N.G.	17.3	France	41.0
8	CAR	17.2	Canada	40.0
9	Brazil	15.9	New Zeal.	39.5
10	Zambia	15.1	Sierra Leon	36.0
11	USA	14.7	UK	35.7
12	Finland	14.5	USA	35.0
13	Haiti	14.4	Australia	34.3
14	Fiji	13.4	Switzerland	34.0
15	Australia	13.0	Germany	31.6
16	Trim. & Tob1	12.5	Sweden	28.3
17	Swaziland	12.1	Kor. Rep.	27.8
18	Jamaica	11.7	Swaziland	26.8
19	Guyana	11.6	Zimbabwe	24.6
20	Norway	11.2	Norway	24.1
21	So. Africa	11.0	Lesotho	23.6
22	Guatemala	10.0	Jamaica	23.5
23	Sweden	10.0	Malawi	22.4
24	Panama	9.0	Botswana	22.4
25	Mauritius	8.7	Kenya	21.0

Tropics. This variable measures the proportion of a country's land and water that is in a tropical climate. Since economic behavior is more costly in tropical climates (Sachs & Warner, 1997), returns to investment in education should be lower, resulting in lower educational attainment levels for both males and females, with an ambiguous prediction about the education gender gap.

Female Labor Force Participation. Labor force participation rates can have an ambiguous relationship with female education. On one hand, higher female labor force participation rates can create incentives to invest in education; conversely, participation in the labor force can be a substitute for education and might decrease investment in secondary and/or higher education. Countries in which more than half the population are Catholic have on average a 15 percent lower female labor participation rate than Protestant countries (Tzannatos, 1999).

3 Empirical Results

3.1 Trans-megabloc religion, female attainment and the gender gap

Table 4 contains estimates of female educational attainment as a function of trans-megabloc adherents and the control variables (Equation (1)). The estimates show only occasional significance of British colonial heritage or no colonial heritage, tropics, or women in the labor force. In contrast, young adult mortality is a powerful predictor of female educational attainment, increasing the proportion of unschooled females and reducing their proportion at all levels of educational attainment. Thus the estimates offer strong confirmation of Tamura's (2006) model of fertility, mortality, and human capital investment.

The case of trans-megabloc religions is not as strong as the mortality variable but certainly more important than the other control variables. More importantly, the direction of influence tends to favor female education. There are fewer unschooled females and more females achieving primary and secondary education as this variable increases. The only exception is higher education where the sign of the coefficient is positive but the estimate is not significant. In short, we find no evidence that religions induce domesticity or that machismo leads to reduced female educational attainment as Balmer (1994, 1999) claims for North American conservative Christians. The results are the opposite.

The order of magnitude is noteworthy. A one standard deviation in-

Variable	Regression Coefficient/(t-statistic)			
	No Schooling	Primary Ed.	Secondary Ed.	Higher Ed.
Intercept	0.360 (2.34)	1.092 (0.9139)	1.172 (0.936)	3.011 (1.832)
Transmegabloc	-1.434*** (-3.31)	0.850** (2.44)	0.852** (2.671)	0.558 (1.224)
Mortality	1.487*** (12.188)	-.459*** (-3.299)	-0.841** (-5.859)	-1.298*** (-7.713)
British Colony	-0.253 (-1.280)	-0.142 (-0.821)	0.558*** (3.47)	-2.046 (-0.938)
No Colony	0.013 (0.066)	0.012 (0.054)	0.266 (1.61)	-.507* (-1.918)
Urban	-0.006 (-1.100)	-0.007 (-1.451)	0.515 (1.120)	0.123** (1.920)
Tropics	-1.45 (-0.75)	0.677*** (3.336)	0.141 (0.723)	-0.774 (-0.288)
Women in Labor Force	-1.116*** (-2.954)	-2.550 (-0.818)	-0.433 (-1.60)	-0.997*** (-2.48)
Adj. R ² /SER	0.820/.709	.150/.669	.712/.578	.754/.799

Mortality is in natural logs. *, **, and *** represent significant at the 10, 5, and 1 percent levels.

Table 4. Female Attainment Level, Transmegabloc Adherents and Control Variables

crease in the proportion of trans-megabloc adherents would decrease the percentage of unschooled females, at the mean, from 30.5 to 25.9. For public school attainment, female attainment would move from the mean of 35.2 percent to 39.0 percent. For secondary attainment, the percentage of females would increase from 24.3 percent to 26.9.

Table 5 contains the estimates for the female minus male gender gap. The results are similar to the attainment results in Table 4, except for two

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Variable	Regression Coefficient/(t-statistic)			
	No Schooling	Primary Ed.	Secondary Ed.	Higher Ed.
Intercept	0.857 (1.329)	-.945 (-1.55)	1.99 (3.41)	1.81 (2.15)
Transmegabloc	-0.898*** (-3.623)	0.509*** (3.223)	0.679*** (3.550)	0.255 (1.025)
Mortality	0.241*** (3.48)	-0.180** (-2.73)	-0.442*** (-7.55)	-0.474*** (-5.31)
British Colony	0.111 (0.901)	0.003 (0.297)	-.071 (-0.665)	0.036 (0.28)
No Colony	0.931 (0.857)	0.127 (1.181)	-0.203** (-2.41)	-.145 (-0.86)
Urban	-.369 (-1.232)	0.264 (1.276)	-0.101 (-0.478)	0.003 (0.01)
Tropics	-.236** (-1.98)	0.045 (0.473)	0.408*** (4.602)	0.117 (0.870)
Women in Labor Force	-0.111 (-0.771)	0.236 (0.236)	-.430*** (-3.112)	-.390** (-2.07)
Adj. R ² /SER	.371/.424	.396/.336	.454/.365	.408.450

Mortality is in natural logs. *, **, and *** represent significant at the 10, 5, and 1 percent levels.

Table 5: Gender Gap, Transmegabloc Adherents and Control Variables

control variables, tropics and women in the labor force. The mortality variables are again quite significant underscoring the robustness of the Tamura (2006) model. The trans-megabloc estimates are again quite significant for all but the higher education case. There is no evidence that

Variable	Regression Coefficient/(t-statistic)			
	No Schooling	Primary Ed.	Secondary Ed.	Higher Ed.
Intercept	-0.877 (-.634)	2.518 (2.00)	1.791 (1.463)	4.098 (2.555)
Transmegabloc	-0.602 (-1.31)	-0.108 (-0.314)	.436 (1.269)	-0.172 (-0.347)
World Religions	1.242*** (4.278)	-1.431*** (-4.640)	-.622** (-2.437)	-1.09** (-2.907)
Mortality	1.103*** (7.500)	-.017 (-0.101)	-0.649*** (-3.77)	-0.961*** (-4.626)
British Colony	-0.549** (-2.709)	0.200 (1.180)	0.706*** (3.77)	0.055 (0.255)
No Colony	-.169 (-0.895)	0.220 (1.001)	.357** (1.964)	-0.348 (-1.26)
Urban	-.902* (-1.687)	-.003 (-0.807)	0.664 (1.46)	0.15** (2.387)
Tropics	0.119 (0.572)	0.372** (2.04)	0.009 (0.043)	-.309 (-1.172)
Women in Labor Force	-.065* (-1.806)	-.783** (-2.544)	-.662** (-2.35)	-1.400** (-3.272)
Adj. R ² /SER	.843/.662	0.317/.600	.724/.565	.7711.769

Mortality is in natural logs. *, **, and *** represent significant at the 10, 5, and 1 percent levels.

Table 6: Female Attainment Level, Transmegabloc Adherents, World Religions, and Control Variables

trans-megabloc Christians inhibit female education. Indeed, increases in the proportion of trans-megabloc Christians are associated with greater female educational attainment and a smaller gender gap for all but high-education where there is no discernible effect.¹

3.2 The effect of other religions

There is some evidence that other world religions have negative effects on female educational attainment levels and the female-male gap in educational attainment. The results are documented in Norton and Tomal (2009) and Cooray and Patrafke (2012). Our testable hypotheses regarding the proportion of other world religions again allow a range of possibilities. There is emerging evidence that rising proportions of ethnoreligious, Hindu, and Muslim adherents are associated with negative levels of female educational attainment (Norton & Tomal, 2009; Cooray & Patrafke, 2011). Accordingly, the alternative hypothesis is positive for the absence of female schooling and negative for female educational attainment in both the absolute sense and with respect to male absence of schooling and male achievement.

Table 6 contains the estimated results for female educational attainment with other world religions (ethnoreligious, Hindu, and Muslim adherents) included as a single variable. The results are similar to Table 5 for the control variables but the trans-megabloc variables are no longer statistically significant.² Moreover, the negative effects for female attainment are significant for the world religions.

The magnitudes merit attention. A one standard deviation increase in other world religions would increase the percentage of unschooled from the mean of 30.5 to 36.1. The same hypothetical change would reduce female primary educational attainment to 27.6 percent versus a mean of 35.2 percent and reduce secondary female education to 22.1 percent from a sample mean of 24.3 percent. Female higher education would be reduced to 8 percent, compared to a sample mean of 10 percent.

Table 7 contains the estimates of equation (2) with the world religions variable also included. The results are similar to Table 6 in the sense that world religions dominate the trans-megabloc variables and amplify the gender gap at the expense of female education relative to male education. The pattern for world religions holds for all levels of education.

The main exception is in the case of the unschooled category. In this case, the results for other world religions are only marginally significant, while the coefficient for the trans-megabloc is negative and the absolute value of the coefficient is substantially greater. The positive effect of world religions on the proportion of unschooled females relative to unschooled males (Table 7) is noteworthy, but more significant in magnitude is the negative effect on the proportion of unschooled fe-

Variable	Regression Coefficient/(t-statistic)			
	No Schooling	Primary Ed.	Secondary Ed.	Higher Ed.
Intercept	0.463 (0.714)	-.481 (-0.872)	2.57 (3.938)	2.489 (2.85)
Transmegabloc	-0.633** (-2.065)	0.198 (1.16)	0.293 (1.600)	-0.199 (-.741)
World Religions	0.396* (1.750)	-.465*** (-3.065)	-.576*** (-3.133)	-.678*** (-3.327)
Mortality	0.119 (1.124)	-.036 (-0.423)	-0.363*** (-5.03)	-.265*** (2.38)
British Colony	0.017 (0.129)	0.113 (1.04)	0.074 (0.64)	0.198 (1.478)
No Colony	0.035 (0.108)	.194* (1.77)	-0.132 (-1.40)	-0.048 (-0.27)
Urban	-.462 (-1.496)	0.372* (1.89)	-0.500 (-0.02)	0.161 (-0.56)
Tropics	-0.152 (-1.189)	-0.054 (0.570)	0.323*** (3.39)	-0.027 (-0.194)
Women in Labor Force	0.036 (0.155)	0.064 (0.420)	-0.385*** (-2.57)	-0.641*** (-3.17)
Adj. R ² /SER	.387/.419	.442/.322	0.457/0.364	0.462/0.429

Mortality is in natural logs. *, **, and *** represent significant at the 10, 5, and 1 percent levels.

Table 7: Gender Gap Level, Transmegabloc Adherents, World Religions and Control Variables

males relative to males of trans-megabloc adherents. The proportion of trans-megabloc adherents in a country appears to reduce the proportion of unschooled women relative to men. A one standard deviation increase in trans-megabloc adherents would reduce the female-male unschooled

gap from 8.6 to 7.1 percent, while a one standard deviation increase for other world religions would increase the female-male gender gap from 8.6 percent to 9.1 percent.

4 Conclusion

The connection between trans-megabloc Christian adherents and female education is subtle. Some of our empirical estimates show that higher proportions of this form of committed Christian adherents in a country's population enhance female education in an absolute sense and relative to male education. More salient is the fact that other world religions have substantially greater effects and those effects are negative. The evidence here that cultural variables affect the stock of human capital suggests that religion may indeed have implications for economic wellbeing in general.

Endnotes

- 1 In a previous draft, we estimated the results with the separate components of the trans-megabloc variables included. The results were significant and favored female education in at least some estimates for evangelicals, great commission Christians, and Pentecostal/charismatic adherents, especially for the gender gap. The results are available from the authors.
- 2 With the other world religions included, the estimates for evangelicals, great commission Christians and Pentecostals are also weaker, but less so for Pentecostal/charismatics. These results are also available from the authors.

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British Colony (N=29)	No Colony (N=34)	All Others (N=34)
Australia	Austria	Algeria
Bangladesh	Bahrain	Argentina
Botswana	Belgium	Benin
Canada	Cameroon	Bolivia
Cyprus	China	Brazil
Egypt	Denmark	Central African Republic
Fiji	Finland	Chile
Gambia	France	Columbia
Ghana	Germany	Congo
Guyana	Greece	Costa Rica
India	Iceland	Dem. Republic of Congo
Jamaica	Iran	Dominican Republic
Kenya	Iraq	Ecuador
Lesotho	Ireland	El Salvador
Malawi	Israel	Guatemala
Malaysia	Italy	Haiti
Mauritius	Japan	Honduras
Myanmar	Jordan	Indonesia
New Zealand	Korea	Mali
Pakistan	Kuwait	Mexico
Sierra-Leone	Malta	Mozambique
Singapore	Nepal	Nicaragua
Sri Lanka	Netherlands	Niger
Swaziland	Norway	Panama
Trinidad & Tobago	Poland	Papua New Guinea
Uganda	Portugal	Paraguay
United States	Spain	Peru
Zambia	Sudan	Philippines
Zimbabwe	Sweden	Rwanda
	Switzerland	Senegal
	Syria	South Africa
	Thailand	Togo
	Turkey	Tunisia
	UK	Venezuela

Table A1. Countries in Sample (N=97)

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Variable	Description
Unschoolled	Percentage of the female population 15 and older with no schooling. Source: Barro-Lee Data Set: www.barrolee.com
Educational Attainment	Percentage of country's population 15 and older who have attended primary, secondary, and higher education. Source: Barro-Lee Data Set: www.barrolee.com
Religion	Percentage of country's population considered adherents of trans-megabloc religious groups, as well as ethno-religious, Hindu, and Muslim adherents (World Religious variable). Source: Barrett, Kuriam, and Johnston (2001).
Colony	Dummy Variables for former British colony or no colonial status. Source: Grier (1997, 1999); Munro (1996).
Tropics	Percentage of land and water that is tropical. Source: Global Data Manager 3, World Game Institute (1990).
Urbanization	Percentage of country that is urbanized. Source: World Bank Development Indicators (2006).
Female Labor Part. Rate	Female labor as fraction of the total labor force Source: World Bank Development Indicators (2006).
Young Adult Mortality	Percentage of the population not surviving to age 40. Source: United Nations Human Development Report (1997).

Table A2. Data Description and Sources

Variable	Mean	Std. Dev.	Minimum	Maximum	Country (Max.)
Female Education Attainment					
No Schooling	30.5	26.52	0	91.2	Mali
Primary	35.17	14.28	6.9	69.6	Lesotho
Secondary	24.32	15.57	1.5	60.1	Norway
Higher Education	10.01	10.17	0.1	53.5	Canada
Education Attainment Gender Gap					
No Schooling	8.63	10.54	-12.6	32.5	Togo
Primary	-2.4	8.32	-27.1	19.7	Austria
Secondary	-3.62	6.55	-22.6	10.9	Australia
Higher Education	-2.62	3.08	-17.2	3.4	Philippines
Transmegabloc	32.7	23.17	0.3	90.3	Swaziland
Evangelical	5.53	6.11	0	24.5	Rwanda
Great Commission	14.87	12.76	0.2	48.2	Ireland
Pentecostal/ Charismatic	12.31	11.82	0.1	51.9	South Africa
Former British Colony	0.3	0.46	0	100	Numerous
No former Colonization	0.35	0.48	0	100	Numerous
Urbanization	54.84	23.77	6	100	Singapore
Tropics	48.83	47.52	0	100	Numerous
Mortality	14.11	12	2.2	52.1	Sierra Leone
Women in Labor Force	37.7	8.31	16.8	54	Mozambique

Table A3. Descriptive Statistics- Dependent and Independent Variables

