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Effects of Female Education on Economic Growth: A Cross Country Empirical Study

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Abstract

This study examines the extent to which women's education affects long-term economic growth in the Asia Pacific region. It focuses on the time period between 1990 and 2010, using data collected in randomly selected Asia Pacific countries: Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. In addition, it emphasizes the impact of female education on economic growth as measured by GDP, literacy, fertility, and the female labor force. Using panel regression analysis, it is found that the fertility rate, female labor force participation rate and female primary school enrollment are significant factors for annual per capita income growth.

Keywords: Female education • Economic growth • Asia Pacific region • Fertility rate • Female labor force participation rate • Panel data • Random effects model

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More than half of the world's population lives in the Asia Pacific region. Many of them face extreme poverty, as close to half of them earn less than a dollar per day. This region has a high primary school enrollment ratio and literacy rates, despite the lack of gender equality in education. In addition, it is difficult to find labor participation rates for both women and men. With regard to education, the gender gap is very strong in the Asia Pacific region, particularly at the secondary or high school level. For example, courses such as nutrition, nursing, and teacher training are dominated by girls while boys would select engineering, law, agriculture, and technology courses. In the Philippines, for example, more than 90 percent of female students are enrolled in female-dominated courses.

Poverty is analyzed through many factors including per capita income, distribution of assets and income, quality of government, its policies, and institutions related to education, health and other aspects of human development. The poor living in rural and urban areas face different issues. While the rural poor have limited access to education and health care, the urban poor depend on cash for survival as they are unable to grow their own food unlike their rural counterparts. It is also difficult for the urban poor to find good jobs due to the lack of higher education. This study explores the relationship between women's education and economic growth in the Asia Pacific region, which faces major problems in the level of economic development, school enrollment as well as gender discrimination in enrollment (Asia-Pacific Forum for Environment and Development [APFED], 2000). The Asia Pacific region is divided into five sub regions: South Asia, Southeast Asia, Northeast Asia, Central Asia, and the Pacific. From these sub regions, several countries have been selected for analysis in this study. These include Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. Myanmar is the poorest among these countries as well as in the Southeast Asian sub region: 20% of Myanmar's citizens are below the national poverty line. Compared to other countries in the Asia Pacific region, Myanmar also has the highest infant mortality rate, and more than 20% of children from poor families do not attend school.

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Literature Review

There are two very basic reasons for examining a link between education and economic growth. First, at a general level, living standards have risen tremendously. Education is now necessary for people to benefit from scientific advancement as well as to contribute to it. Second, at a more specific level, a wide range of econometric studies indicates that the income levels that individuals can command depend on their level of education. If people who are educated earn more than those who are not, shouldn't the same be true of countries? The level of output per hour worked in a country, if not the rate of change of output per hour worked, ought to depend on the population's educational attainment. If spending on education delivers returns of some sort, in much the same way as spending on fixed capital does, then it is sensible to talk of investing in human capital as the counterpart to investing in fixed capital. Hence, the process of education can be analyzed as an investment decision. The effect of formal and informal education on farmers' efficiency and income levels has long been analyzed in economics literature. Hussain and Byerlee (1995) highlighted that returns for schooling in agriculture may be as high as for urban wage earners. Lockheed, Jamison, and Lau (1980) indicated a positive effect of education on output, and though the results were mixed, they noted that a significant positive relationship was more likely to be found in areas where farmers are modernizing. Phillips (1994) found that the average increase in output was due to an additional four years of schooling, while Appleton and Balihuta (1996) indicated that education was not found to be significant. Mirotchie (1994) investigated technical efficiency in cereal crop production in Ethiopia using aggregate data for the 1980–86 period. He reported that primary schooling tends to increase productivity, while secondary schooling has no effect. Weale (1992) found positive and significant returns for additional years of formal schooling in terms of increased output of cereal crops. Serin, Bayyurt, and Civan (2009) discovered a positive link between education and farmers' incomes in Turkey.

There are also studies on the role of gender equality and women's empowerment in reducing poverty and stimulating economic growth. Morrison, Raju, & Sinha (2007) proved that the impact of women's rights and decision-making power in families helped reduce poverty and improve productivity at per person and family levels. In addition, they showed the relationship between gender equality and poverty reduction and economic growth at the macro level. **Ö**zpolat and Yıldırım (2009) investigated the relationship between the education of women and economic growth by analyzing the economic dimension of women's education. She expressed that it has been long concluded that education of women has a positive effect on economic growth in all societies especially in developing countries, and called for more attention on women's education. She also explained that the net returns on education and training of women are greater than that for men. Schultz (1961) who was the first economist, studied the difference in worker productivity by gender, based on their work experience and schooling. Becker and Thomes (1994) also indicated that different wages among workers was in line with the difference in their education level, training, and work experience. Bourguignon and Morrison (2002) examined how higher education levels lead to lower fertility rates by affecting per capita income growth and decreasing mortality rate per child. Barro (1991) revealed that more educated households are likely to have higher productivity than more children; this shows that education and fertility rate have a negative effect on each other. Barro (1991) also said that the economic growth rate is related to changes in human capital and schooling years. Baden and Green (1994) however argued that women's education is not the main factor for improved child health and welfare and reduced fertility, and that it is more effective to spend directly on child health and family planning to reduce fertility and child mortality instead of investing in educating women. Dollar and Gatti (1999) also studied the relationship between gender inequality in education and economic growth. They explained the positive relationship between the education of women and economic growth by using a five-year growth interval and by controlling for possible endogeneity among education and economic growth with the help of instrumental variable estimation. Klasen and Lamanna (2008) also investigated the impact of gender inequality in education and employment on economic growth in developing countries through a 41-year period (1960–2000). He revealed that gender inequality in education and employment can reduce economic growth, and also stated that reducing gender inequality would lead to economic development because the education of women has a huge impact on fertility and the creation of human capital for the next generation.

Dollar and Gatti (1999) found a negative link between the gender gap in education and economic growth, in contrast to Barro's (1999) view that there is a positive relationship between the two. This prompted Klasen (2008) to avoid using the same methods as the previous researchers, to discover why they found differing relationships between gender gap in education and economic growth. Klasen (2008) showed very close links between gender inequality in labor force participation and employment, and also found that decreasing marginal returns on education means that the education of women is limited to the lower level. An increase in male education levels when the marginal return on the education of women is higher than that for males, will affect economic performance. Many theorists believe that one of the most effective ways to reduce the fertility rate per woman and the child mortality rate—which will positively impact economic growth—is by promoting the education of women as this would lead to education for the next generation. Bloom and Williamson (1998) also examined education and economic growth by focusing on "demographic gift"; how falling fertility rates lead to a favorable demographic constellation after 20 years. They also found that a woman's increased employment earnings provide her with greater bargaining power within her household. An increase in women's earnings also leads to greater savings and economic growth. Bloom and Williamson (1998) came to this conclusion by using the short-term growth model, unlike the other researchers who used the long-term growth model. Therefore, Bloom and Williamson's (1998) conclusions may differ from those of other researchers.

Human Capital Theory expounds the view that education leads to higher skills among workers for better productivity, and that the rate of return on education investment surpasses that of other investments. Human capital theorists use various methods to corroborate these views. First, they examine employee wages by comparing workers' education levels. Using the "normal" assumptions of competitive labor and goods markets, human capital theorists conclude that education levels not only help workers acquire skills for better productivity, but also encourage them to improve their abilities and attain greater earning power. Correspondence Theory also provides numerous implications for poverty reduction policies as it is an effective anti-poverty strategy that should be included in education and skills training especially among poor households. Studying data from rural China, Brown (2006) concluded that the education of mothers—compared to that of fathers—has a higher effect on the investment on education for their children. Using household survey data from Brazil and Ghana, Thomas (1994) also found that the education of daughters is largely affected by the education of mothers, while the education of fathers has a significant effect on the education of sons. Controversially, Quisumbing and Maluccio (2003) had opposite results with their study in Ethiopia, which found that the assets brought to the marriage by the mother are more than those brought by the father the educational outcome of the daughters is lower compared with the sons. They also conducted a similar investigation in Indonesia, and found that the assets of the mother have a positive and significant effect on sons' education, but no significant effect on daughter's education, while a more educated father positively effects the education of daughters. Kızılgöl (2012) also explored the impact of gender inequality in education on poverty in Turkey. This paper indicated that educated, male-headed households in urban areas have a lower probability of poverty compared to uneducated female-headed households in rural areas. Moreover, Kızılgöl (2012) noted that increasing female-male ratio for literacy, for education of 10 years and above as well as for earnings would lead to a higher probability of poverty eradication.

Using time series models with the help of economic variables, Ince (2011) also studied how women's education is important for Turkey's development. She noted that education is a significant factor for social and economic progress, especially in Turkey, as it can increase the welfare of its society. She also concluded that education can be used as a predictor of human capital. Oxaal (1997) also considered the role of women's education in reducing poverty, noting that females from developing countries have less opportunity for schooling than males. She also found that poverty forces children, especially girls, from poor families to receive less opportunity for schooling. The opportunity cost of sending girls to school is very great for poor households as the labor of girls is used to replace that of their mothers, for example in providing childcare for their younger siblings.

As our interest is in the impact of women's education on economic growth for Asia Pacific countries, the aforementioned literature has helped to inform the selection of unique explanatory variables for our empirical study.

A Panel-Data Model: Random Effects Model

For this study, the random effects (RE) model was used to analyze the data set included in the panel data processes. The RE model, also known as the variance components model, considers the panel data structure between dependent and independent variables (Balestra & Nerlova, 1966; Baltagi, 2005; Hsiao, 2003). Using panel data for estimation ensures control for missing and unobserved variables and for the relationship identification of country–specific effects (Arellano & Bond, 1991; Matyas & Sevestre, 1996).

A panel data set has multiple observations on the same econometric units. With panel data, each element has two subscripts; the group identifier i, and the within-group index denoted by t in econometrics, which usually refers to time. The most general linear representation of panel data is:

$$y_{it}=\Sigma_{k=1}^{k} x_{kit}\, \beta_{kit} + \varepsilon_{it},\ i= 1,2, \dots , N,\ t = 1,2, \dots ,T \quad (1)$$

where N is the number of individuals, T is the number of periods.

One set of data estimators allow heterogeneity across panel units (and possibly across time) but confines that heterogeneity to the intercept terms of relationship. There are fixed-effects and RE models which impose restrictions on the above model of thereby allowing only a constant to differ over i. In particular, it restricts the slope coefficients to be constant over both units and time, and allows for an intercept coefficient that varies by unit or time. For a given observation, an intercept varying over units results in the following structure:

$$y_{it} = x_{kit}\, \beta_{kit} + z_t\delta + u_i + \varepsilon_{it} \quad (2)$$

where is a 1xk vector of variables that vary over individual and time, is the kx1 vector of coefficients on , is a 1xp vector of time-invariant variables that vary over individuals, is the px1 vector of coefficients on , is the individual-level effect and is the disturbance term. The is either correlated or uncorrelated with regressors in and. If the is uncorrelated with the regressors, this is known as random effects (RE). RE estimators use the assumptions that the is uncorrelated with the regressors to identify the and coefficients (Maddala, 2006).

To implement RE formulation of (2), it is assumed that both and are non-zero processes, uncorrelated with the regressors; they are each homoskedastic in that there is no correlation over individuals or time. For the T observations belonging to the unit of the panel, one can assume the composite error process as follows:

$$v_{it} = u_i + \varepsilon_{it} \quad (3)$$

This is known as the error components model with conditional variance

$$cov(v_{it}, v_{is}) = \sigma_u^2 + \sigma_\varepsilon^2 \ \text{fort} = s \quad (4)$$

and conditional covariance within a unit of

$$cov(v_{it}, v_{is}) = \sigma_u^2 \ \text{for}\ t \neq s \quad (5)$$

$$cov(v_{it}, v_{is}) = 0 \ \text{for all}\ t, s \ \text{if}\ i \neq j \quad (6)$$

As the errors are correlated, generalized least squares (GLS) has to be used to obtain efficient estimates (Maddala, 1971). It can be written as follows:

$$\hat{\beta}_{GLS} = \theta = \frac{\sigma_\varepsilon^2}{T\sigma_u^2+\sigma_\varepsilon^2} \quad (7)$$

Thus the ordinary least squares (OLS) and fixed-effects model estimators are special cases of the GLS estimator with and , respectively. According to (7), if T is large or is large relative to will be very close to zero, and the GLS estimator is very close to the fixed-effects model estimator. In actual practice, it is not known and needs to be estimated based on preliminary estimates. Several methods have been suggested in the literature (Fuller & Battase, 1973; Hauthakker, Verleger, & Shechan, 1974; Nerlove, 1971).

Breusch and Pagan (1980) have developed a lagrange multiplier (LM) test for , which may compute the RE estimation. It is possible to estimate the parameters of the RE model with full maximum likelihood. The application of maximum likelihood estimation continues to assume that the regressors and are uncorrelated, adding the assumption that the distributions and are normal. The estimator will produce a likelihood ratio test of corresponding to the Breusch-Pagan test available for GLS estimator.

Hausman test is usually applied to test for fixed versus RE models. If the regressors are correlated with the fixed-effects estimator is consistent but the RE estimator is not. If the regressors are uncorrelated with, the fixed-effects estimator is still consistent, albeit insufficient, whereas the RE estimator is consistent and efficient. There are two scenarios in the Hausman test: (1) If both fixed effects and RE models generate consistent point estimates of the slope parameters, they will not differ meaningfully. (2) If the orthogonality assumption is violated, the inconsistent RE estimates will significantly differ from their fixed effects counterparts (Baum, 2006; Hausman & Taylor, 1981). The Hausman test uses as a -statistic with degrees of freedom k where k is dimensionality of and estimators.

Method

A panel regression is used based on theoretical and empirical literature that explores the link between female education and economic growth. A balanced panel of 231 observations from 11 randomly selected Asia Pacific countries over the 1990–2010 period (21 years) is used in this study. The sample of the countries represents all major regions in the Asia Pacific area, which reflects the characteristics of female education on economic growth. Special attention is given here to theoretical and empirical literature on how education as human capital affects living standards and economic growth as a society in Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam, where female education has an impact on female labor force participation rates.

A panel regression is used based on the studies done in the literature. There are fixed and random effects in a panel regression; however we use and determine only random effects. Gross domestic product (GDP) per capita will be used as a dependent factor, while literacy rate, fertility rate, female labor force participation and female enrollment for primary and tertiary schooling will be used as independent factors of GDP.

The effects of these independent variables on GDP per capita are studied using the following equation:

$$y_{it} = x_{kit}\,\beta_{kit} + v_{it},$$

where *β is coefficient vector while* constant term is zero and is the composite error term.

Our data sample is for the countries of Bangladesh, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam. The period for analysis is from 1990 to 2010.

Table 1
Definitions and Sources of the Variables

Variables	Definitions	Sources
1. Dependent Variables		
Gross Domestic Product (GDP) per capita	Annual percentage growth rate of GDP per capita	WBI, IM
2. Independent Variables		
Labor force female	Labor force participation rate, female (% of female population ages 15–64)	WBI
school enrollment primary female	School enrollment, primary, female (% gross)	WBI, IM
school enrollment tertiary female	School enrollment, tertiary, female (% gross)	WBI, IM
Literacy rate adult female	Literacy rate, adult female (% of females ages 15 and above)	WBI, IM
Fertility rate	Fertility rate, total (births per woman)	WBI

NOTE: WBI means World Bank Indicators and IM means Index Mundi (a website featuring country profiles with detailed country statistics, charts, and maps compiled from multiple sources).

The data set is provided in Table1, where GDP per capita represents growth of real Gross Domestic Product as an annual ratio in the specified countries. Labor force female indicates the female labor force participation ratio in the country and labor force is denoted as an age interval of between 15 and 64. School enrollment primary female represents the rate of female students attending primary schools in these countries. Similar to school enrollment primary female, school enrollment tertiary female is the total female enrollment in tertiary education regardless of age, expressed as a percentage of the total female population.

Literacy rate adult female is the literacy rate for adult women as a percentage in these countries, while *fertility rate* indicates the ratio of live births per woman. The data set was obtained from the World Bank and Index Mundi.

Findings and Discussions

In this section, the estimation results for the effects of selected explanatory variables on GDP are presented. The descriptive statistics and regression results are provided by the construction of the RE model. Stata 12.1 software program was used to derive the test results.

The descriptive statistics are shown in Table 2. The analysis began with checking the means and standard deviations for cross-sectional time-series data in order to see the variations between and within countries. The results were as expected. The variables we have entered in the analysis show different results; the *GDP per capita* vary more between countries than within countries. GDP per capita in the given time span shows an overall average of 4.95%. However, the minimum progress rate averages −14% while the overall maximum progress is 13%. Means and standard deviations correspond for the GDP. The average *female labor force participation* is 42.34%, which shows that nearly half the labor force in these countries comprises women. Even though this result does not include returns from the informal economy, the minimum and maximum rates of female labor force indicate how important it is in these countries. The average *school enrollment primary female* is 80%, which means that most girls in these countries are sent to primary or elementary schools. In these countries, the minimum rate of primary school attendance is 74%; this indicates that most women would have a basic level of education. *School enrollment tertiary female* is very low when it is compared with primary school attendance rates; an average of 14% with a minimum of 0.11% and maximum of 52%. It can be easily interpreted that most girls are not sent to middle–high schools in these countries. This indicates that the female labor force is considered for lower-level jobs, which utilize hands more than minds. *Literacy rate adult female* also supports the finding that most women would have attended primary school; the overall literacy rate averages 73% with a 25% minimum rate and 97% maximum rate. This literacy rate indicates that most women in these countries can read and write in their own languages. The average *fertility rate* is almost three children per woman; a woman in these countries has at least 1 (actually 1.5) child and at most six children. The number of observations for this study is 231, the number of countries with observations is 11, while the average number of time periods for each country is 21 years, which is between 1990 and 2010.

Table 2
Descriptive Statistics

Variable		Mean	Standard Deviation	Minimum	Maximum	Observations
GDP per capita	overall	4.955418	3.745761	-14.28697	13.60512	N = 231
	between		2.190127	1.649321	9.220029	n = 11
	Within		3.106633	-12.96472	11.1412	T = 21
Female labor force participation	overall	42.33953	7.134958	25.33253	52.63609	N = 231
	between		7.437739	27.90929	50.72076	n = 11
	Within		6.63095	39.76277	44.25487	T = 21
school enrollment primary female	overall	80.6875	11.86209	74.26859	86.6424	N = 231
	between		6.861291	71.23098	81.8361	n = 11
	Within		9.885618	56.44514	85.4983	T = 21
school enrollment tertiary female	overall	14.26564	13.00658	0.11243	52.58035	N = 231
	between		12.07529	2.117487	36.12128	n = 11
	Within		6.003147	-3.322685	34.04903	T = 21
Literacy rate adult female	overall	72.93338	19.5229	25.00	96.57463	N = 231
	between		19.55581	38.48239	93.02669	n = 11
	Within		5.654108	59.451	86.66782	T = 21
Fertility rate	overall	2.954134	1.009975	1.579	6.152	N = 231
	between		0.8540515	1.767571	4.352905	n = 11
	Within		0.59504	1.348229	4.753229	T = 21

Table 3
Random Effects Model Estimation Results

Independent Variables	Coefficients	Probability values
Female Labor Force Participation	0.0980104*	0.003
School Enrollment Primary Female	0.0514311*	0.001
School Enrollment Tertiary Female	-0.1004744*	0.000
Literacy Rate Adult Female	0.0096712	0.633
Fertility Rate	-1.243608*	0.000
Number of Observations	231	
Adjusted R-square	0.59	

(*) indicates significance level 1%

According to the test results in Table 3, the four variables; *labor force participation female*, *school enrollment primary female*, *school enrollment tertiary female*, and *fertility rate* are found to be significant for all countries in the study. The variables explain approximately 60% of variations in GDP per capita levels of our selected 11 countries.

The result for *literacy rate adult female* is found to be insignificant with the value (p = 0.633) in explaining our dependent variable GDP per capita of these countries. *Labor force female participation* is found to be significant with the value (p = 0.003) and has a positive effect on these countries' GDP per capita. *School enrollment primary female* and *school enrollment tertiary female* are also found to be significant with the values (p = 0.001) and (p = 0.000) respectively. However, the signs of coefficient estimate reveal that *school enrollment primary female* affect annual GDP per capita growth positively while *school enrollment tertiary female* has a negative effect. *Fertility rate* is found to be the most significant factor on economic growth per capita with the value (p = 0.000); it has an inverse relationship to GDP, and its effectiveness rate is very high.

Table 4
Tests for the Error Component Model

Test Name	Test Statistics	Probability Values
Random effects, ALM (Var (u) = 0)	Two sided: 9.95	Pr>chi2(1) = 0.0016
Random effects, ALM (Var(u) = 0)	One sided: 3.15	Pr>N (0.1) = 0.0008
Serial Correlation: ALM (lambda = 0)	33.02	Pr>chi2(1) = 0.0000
Joint Test: LM (Var(u) = 0, lambda = 0)	59.85	Pr>chi2(2) = 0.0000
F(5.215)	**5.09**	Pr>F = 0.0002
Hausman	**4.74**	Pr>chi2(5) = 0.4480

From Table 4, F test (F(5.215) = 5.09, $p < 0.01$) for fixed effects and LM test ($X^2 = 59.85$, $p < 0.01$) for random effects are significant. If both fixed and random effects turn out significant, the Hausman test can inform the decision on which should be chosen. If the null hypothesis of the Hausman test is rejected as in Table 4 ($p = 0.4480 > 0.05$), the preference would be for the RE model. Our model is a random effect on panel regression LM test that informs the decision between a random effect regression and a simple OLS regression. Residual variance is equal to zero. Chi square is significant and test result is fine to reject classical method. Also, both adjusted and unadjusted can apply, without planning times or countries, with the test of our model being significant. This is evidence of significant differences across countries that can be used by random effects. In addition, a serial correlation test applies to macro panels with 21 years. From Table 4, there is no serial correlation and it means R-squared estimation is real.

Therefore, it is found that a 42% *female labor force participation*, 80% *school enrollment primary female,* 14% *school enrollment tertiary female,* and an average *fertility rate* of three children per woman have a significant effect on *GDP per capita.* On the other hand, a 73% *literacy rate adult female* does not have any significant effect on *GDP per capita*.

Conclusion

In sum, we have examined the contribution of female education to long-term economic growth for 11 selected countries in Asia Pacific, a region chosen for study because of the extreme poverty faced many who live there. We have also used GDP per capita as the dependent factor and female literacy rate, fertility rate, female labor force participation and female enrollment for primary and tertiary schooling as independent factors in our study. Based on previous theoretical and empirical literature, we have found four significant results. First, the female labor force participation rate is found to have an important impact on economic growth per capita. Higher levels of female education have increased labor force participation rates. Women's education is an important factor to increasing female labor force participation, as increasing female schooling will lead to better-educated women who can enter the labor market, secure professional jobs and earn higher incomes. Moreover, better female education can also change traditional attitudes toward women's roles in the labor market.

Second, female primary school enrollment also has a positive effect on annual per capita income growth. There are however many deterrents to female education. For poor families, the opportunity cost of sending girls to school is significant because their labor is often used to replace that of their mothers in terms of childcare for their younger siblings. Another deterrent to female education is that the return on investment for female education is perceived to be lower due to wage inequality. Not only the schooling costs for female are higher but also the private return of the female are lower because the earning incomes for the educated men and women. Also, many societies in these countries still hold the traditional belief that women should stay at home and that daughters will leave their family when they marry, hence there is little need to educate them. Our study shows however, that the expansion of girls' enrollment in primary school has a positive and direct impact on annual GDP per capita growth in these selected Asia Pacific countries. Less budget of primary education is not seemed as a burden on the economy. On the other hand, female enrollment for tertiary schooling has a negative influence on annual GDP per capita growth; our study found that female tertiary school enrollment has a 10% impact on GDP, which means that 10 units of increasing female tertiary school enrollment equals 1 unit of decreasing GDP per capita. This provides evidence that the female labor force structure in these countries is not suitable for educated people, and female labor is often used for unqualified jobs. Also, the inverse relationship between female tertiary school enrollment and economic growth indicates that high school expenditure is too high in the Asia Pacific region.

Third, the adult female literacy rate does not have a significant effect on GDP. This is due to the fact that in this region, the female work force is mostly used as unskilled labor, especially in the textile sector. Hence, the literacy rate seems to be a useless factor.

Finally, fertility rate is the most important factor affecting GDP per capita growth. Birth control is a political issue that can be used by governments to also help reduce fertility rates, as a high rate could remain a very big obstacle of economic growth. Increasing the level of women's education can help reduce child mortality as well as women's fertility rate, which accelerates expansion in education of the next generation.

The results of our empirical study indicate that female education will contribute toward more rapid economic growth in the selected Asia Pacific countries. Beyond these countries, however, our study emphasizes that investment in female education is an important strategy for developing countries, given its higher social rates of return. Promoting female education may also be among the few "win-win" development strategies. Policies that contribute to other essential human development goals such as lower child mortality and fertility rates should be considered with great interest by policy makers around the world. In addition to women's education, other issues such as women's health and nutrition indicators also should be included in further analyses to explore the impact of women's empowerment on long-term economic growth.

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