Women's education and the timing and level of fertility

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2 authors:

Jinyoung Hwang
Hannam University

Jong Ha Lee
Chosun University

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Jinyoung Hwang Jong Ha Lee

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Jinyoung Hwang
Department of Economics, Hannam University, Daejeon, Republic of Korea, and
Jong Ha Lee
IBK Economic Research Institute, Industrial Bank of Korea, Seoul, Republic of Korea

Abstract

Purpose – The purpose of this paper is to estimate the impacts of women's education on the mean age of women at first birth (denoting the timing of fertility) and total fertility rate (TFR, denoting the level of fertility) using cross-country panel data.

Design/methodology/approach – The estimations proceed in two steps: first, the timing and level of fertility regressions are separately estimated, and second, two regressions are estimated at the same time as a form of a system equation to accommodate the correlations between error terms.

Findings – It is found that a higher women's education tends to delay of child birth or family formation. In addition, there exists a negative relationship between the female secondary school enrollment ratio and TFR, meaning that the opportunity costs of childbearing and rearing increases when the level of women's education enhances. However, the authors have also found that the impacts of women's higher education on TFR is statistically insignificant in a few cases of estimations without sample selections.

Originality/value – Fertility decline is a shift of childbearing to older ages. The delay of child birth or family formation is the major cause of the recent fertility decline, because a late women's age at first birth reduces the chances of having any further children. This implies that the timing and level of fertility are highly correlated to each other. In particular, many studies showed that women's education and employment have been identified as major parameters for the increase in women's age at first birth. Nonetheless, little attention has been paid to an empirical analysis of the relationship between women's education and the timing of fertility. Therefore, this paper is an extension of previous studies, estimating the relationship between women's education and the timing and level of fertility at the same time.

Keywords Age at first birth, Fertility rate, Women's education

Paper type Research paper

I. Introduction

Many countries experienced a dramatic decrease of fertility rates from the middle of the twentieth century. The existing literature analyzed a number of determinants on the decreasing fertility rate, and one of them is related to the improvement in women's education (e.g. Basu, 2002; McCrary and Royer, 2011; Sackey, 2005). That is, many studies have attempted to find out whether women's education affects the choice of fertility through women's employment and income level[1].

In addition to fertility decline, one of the most significant demographic changes in most countries over the last a few decades is a shift of childbearing to older ages.

JEL Classifications — C30, J13

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The delay of child birth or family formation is the major cause of the recent fertility decline, because a late women's age at first birth reduces the chances of having any further children (e.g. Kohler *et al.*, 2002; Philipov and Kohler, 2001; Sobotka, 2004). This implies that the timing and level of fertility are highly correlated to each other. In particular, Martin (2000) and Rindfuss *et al.* (1996) showed that women's education and employment have been identified as major parameters for the increase in women's age at first birth. Nonetheless, little attention has been paid to an empirical analysis of the relationship between women's education and the timing of fertility.

The main motivation of this paper is to estimate the impacts of women's education on the mean age of women at first birth (denoting the timing of fertility) and total fertility rate (TFR, denoting the level of fertility) using cross-country panel data. To represent a country's level of women's education, both female secondary and female tertiary school enrollment ratios are used. The estimations proceed in two steps: first, the timing and level of fertility regressions are separately estimated, and second, two regressions are estimated at the same time as a form of a system equation to accommodate the correlations between error terms. Therefore, this paper is an extension of previous studies, estimating the relationship between women's education and the timing and level of fertility at the same time.

The remainder of this paper is organized as follows. Section II presents the theoretical background and related literature to illustrate the relationship between women's education and the timing and level of fertility. Section III describes data descriptions and empirical specifications. Section IV provides empirical findings from cross-section estimations using a few different econometric methods. Finally, Section V concludes the paper.

II. Toretical background and related literature

Several attempts have been made to analyze the effects of women's education on the fertility rate (e.g. McCrary and Royer, 2011; Sackey, 2005), and they found that the two variables are negatively associated. A plausible explanation is that countries with higher women's education (and/or employment) end up with an increase in the opportunity costs of childbearing and rearing (Weil, 2009), which adversely affects fertility. In addition, Becker and Lewis (1973) argued that parents do not only choose the number of children, but how much time and money devoted to each child. In other words, there exists a trade-off relationship between child quantity and child quality. It is easily assumed that the demand for child quality rather than quantity increases as long as the level of women's education enhances. Alternatively, Basu (2002) demonstrated that the education of women improves their status and gender equality, which induces a single-handed role in lower fertility. That is, women's autonomy is important for fertility to fall (this argument was also put forth by Dyson and Moore, 1983)[2].

Although the existing literature examined whether women's education affects fertility rate, they ignored some problems as follows. First, most existing cross-country studies focussed on the relationship between women's employment (not education) and fertility rate by assuming that women's education is highly correlated to employment and career orientation (e.g. Becker, 1991; Bloom *et al.*, 2009; Lehrer and Nerlove, 1986; Mahdavi, 1990). In addition, some studies, such as Adler (1997), Kharkova and Andreev (2000), and Kreyenfeld (2005), presented that women's employment is a chief parameter for reducing fertility, and hence argued economic uncertainty (or instability) is another factor behind the decline in fertility rates. Few attempts have been made to analyze the linkage on whether women's education directly affects fertility rate. Hence, the empirical analysis of this paper will use women's education rather than women's employment.

Second, little empirical evidence exists on the relationship between women's education and women's age at first birth. This is a bit of surprise when considering women's education is a major parameter for the increase in age at first birth (e.g. Martin, 2000; Rindfuss *et al.*, 1996)[3]. However, Matysiak (2008) suggested that the positive association between women's education and the age of women at first birth may not have a linear relation. That is, Matysiak (2008) argued that the relation depends on the level of the female labor force participation rate and institutional qualities that affect childbearing and rearing. Hence, the direct linkage between women's education and the age of women at first birth are not clear, and this paper will examine the issue using cross-country data.

Third, the negative relationship between women's age at first birth and fertility rate in developed countries are widely examined in recent years (e.g. Kohler *et al.*, 2002; Philipov and Kohler, 2001; Sobotka, 2004). For example, Sobotka (2004) estimated that the adjusted TFR, taking into account the differential pace of fertility postponement, is 1.71, contrasted with the TFR of 1.46 in the 25-member European Union countries in 2001. Morgan and Rindfuss (1999) presented that the delay in family formation increases the age of women at first birth as well as fertility decline. The existing literature imply that both women's age at first birth and fertility rate are highly correlated to each other, and hence it is necessary to examine the determinants of women's age at first child and fertility rate at the same time as a form of the multiple equation system with contemporaneously correlated error terms. Hence, both women's age at first child, denoting the timing of fertility, and TFR, denoting the level of fertility, are used as dependent variables in the empirical analysis of this paper.

Therefore, one can empirically establish that a strong and positive association exists between women's education and the timing of fertility (i.e. women's age at first birth), and a strong and negative association exists between women's education and the level of fertility (i.e. TFR), using a cross-section of countries, which is the purpose of this paper.

III. Data description and empirical specification

There are 156 countries, both developed and developing countries from all regions, in the sample, largely dictated by the availability of data. We consider two measures of the female school enrollment ratio to denote a country's level of women's education: first, female secondary school enrollment ratio (denoted throughout as SEND) and second, female tertiary school enrollment ratio (denoted throughout as TERT). These data are measured as the ratio of total enrollment, regardless of age, to the female population of the age group that officially corresponds to the level of education shown, expressed as a percentage. Data on SEND and TERT are drawn from the World Bank (2011).

A country's timing of fertility is measured by the mean age of women at first child birth (denoted throughout as AFB). In addition, the level of fertility is represented by TFR, which represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific. Data on AFB and TFR are drawn from the United Nations (2011) and the World Bank (2011), respectively. Since the United Nations (2011) provides three years, such as earlier year around 1980, mid year around 1995, and latest year around 2005[4], this paper uses the panel data of three years (1980, 1995, and 2005), but, because of data paucity, not every year has the same countries[5].

The changes in patterns of AFB and TFR across countries over time can be identified by Kernel densities, which are provided in Figure 1. It is established that the distribution of AFB in Figure 1(a) diverged across countries over time, implying that a shift of first birth to older ages occurred mostly in developed countries. On the contrary, Figure 1(b) shows that the distribution of TFR converged into around 2 in 2005. Comparing the twin peaks around 2 and 6-7 in 1980, the mean of all countries' TFR reduced over time.

Again, the purpose of this paper is to identify the impacts of women's education on the timing and level of fertility. Hence, the baseline regression takes the following form:

$$Y_{it} = c + \beta_1 X_{it} + \beta_2 MORT_{it} + \beta_3 FLP_{it} + \varepsilon_{it.}$$

Here, $Y = [AFB, TFR]$; the subscript i and t denote countries and years (1980, 1995, and 2005); c is a constant; β_j $(j = 1, 2, 3)$ are the estimated coefficients of the corresponding independent variables; $X = [SEND, TERT]$; ε is an error term. Of particular interest is the estimated coefficient of β_1, implying the impacts of women's education on the timing and level of fertility.

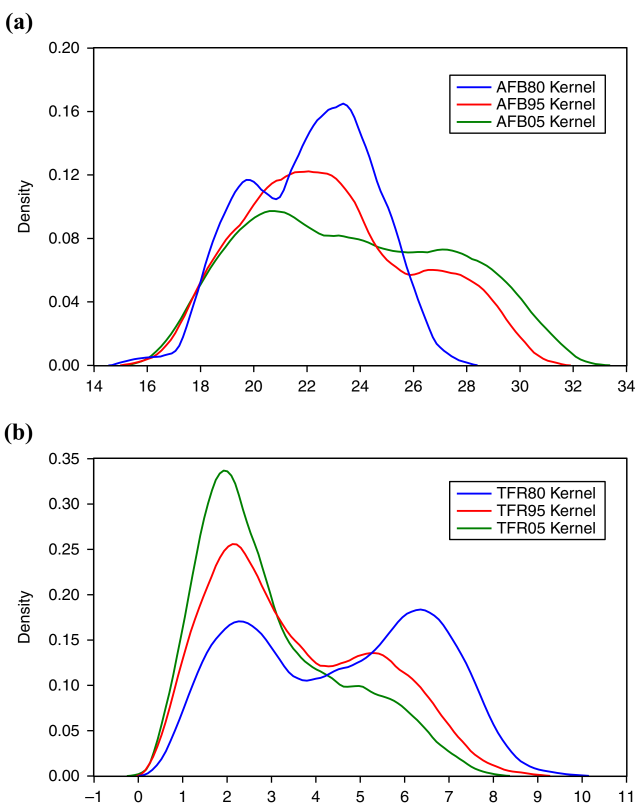

Figure 1.
(a) Kernel density of the mean age of women at first birth (AFB); (b) Kernel density of TFR

In addition to $X = [SEND, TERT]$, mortality rate and female labor force participation rate are considered as explanatory variables. A country's mortality rate is represented by the under-five mortality rate (denoted throughout as MORT), which is expressed in units of deaths that a newborn baby will die before reaching age five per 1,000 individuals per year. Kreyenfeld (2005) suggested that MORT is highly related to the change of fertility. Female labor force participation rate denotes the proportion of female labor force participation to total female population ages 15 and older, in a percentage term (denoted throughout as FLP). Data on MORT and FLP are drawn from the World Bank (2011). Table I contains summary statistics for the variables used in empirics.

To estimate AFB and TFR regressions separately, two methods, such as pooled least squares (pooled LS) and fixed effect (FE) model or random effect (RE) model, are used. When using the pooled LS, *t*-statistics are calculated on the basis of White's heteroskedasticity-consistent standard errors and covariance. There are two typical models for the analysis of panel data in addition to the pooled LS. One is the FE model, which uses a fixed average value of cross-section characteristics. The other is the RE model, which uses an error term for cross-section characteristics. The choice of FE or RE is determined by the result of the Hausman test. The empirical regressions using the method of FE or RE contain μ, which denotes a random unobservable country *i*'s characteristics and does not change over time, as follows:

$$Y_{it} = c + \beta_1 X_{it} + \beta_2 MORT_{it} + \beta_3 FLP_{it} + \eta_{it,}$$
$$\eta_{it} = \mu_i + \varepsilon_{it.}$$

Here, the expressions are the same as in the baseline regression except μ. If we separately regress on the timing and level of fertility, it is likely that error terms are correlated with each other, which induces estimation bias. In other words, a shock affecting AFB may spill over and affect TFR, and vice versa. In this analysis, we will use the seemingly unrelated regression (SUR) estimation of providing unbiased and efficient results in estimating the multiple equation system with contemporaneously correlated error terms.

In addition, separate estimations of the equations are less likely to avoid endogeneity bias, because current levels of women's education may be passed on to next generation through the timing and level of fertility, which is demonstrated by the

	Mean	Median	SD	Max	Min
AFB	23.02	22.70	3.14	30.50	16.50
TFR	3.65	3.13	1.90	8.73	0.87
SEND	65.91	75.56	35.47	150.52	1.62
TERT	25.34	17.32	26.34	100.79	0.002
MORT	70.49	41.20	68.78	322.30	2.90
FLP	49.73	50.30	16.65	90.70	9.50

Notes: The statistics are based on the pooling of three years (1980, 1995, and 2005). AFB (mean age of women at first birth) and TFR (total fertility rate) denote the timing and level of fertility; SEND (female secondary school enrollment ratio) and TERT (female tertiary school enrollment ratio) refer to the levels of women's education; and MORT and FLP denote mortality rate and female labor force participation rate, respectively

Table I.
Summary statistics

trade-off interaction between quantity and quality of children (Becker and Lewis, 1973). Hence, the 3SLS (three-stage least squares) method is also used to estimate the baseline regression, using two instrumental variables, such as population density and the urbanization ratio[6], to address any potential endogeneity bias. Data on population density and urbanization ratio are drawn from the World Bank (2011). Greater population density and the urbanization ratio may reduce the fixed costs of supporting an education system and so there might be gains from agglomeration (e.g. Hwang and Jung, 2006; Sylwester, 2002), but those are less directly related to the timing and level of fertility.

IV. Empirical results

Table II contains the results of separate estimations on AFB and TFR using the methods of pooled LS and FE or RE. The regression results indicate that SEND and TERT are positively associated with AFB, and negatively related to TFR. Except the estimated coefficient of TERT on TFR in Model (H), all estimated coefficients are statistically significant at the 1 percent significance level. This implies that a country with higher women's education increases women's age at first child and decreases the fertility rate. For example, an increase in the SEND coefficient of a country by one standard deviation (35.47 points, see Table I) is associated with an increase in the AFB of about 2.48 percentage points in Model (A), and a decrease in the TFR of about 0.71 percentage points in Model (E), respectively, after accounting for the effects of other explanatory variables.

The results of separate estimations confirm the notion that women's education is a chief factor that induces the postponement of childbearing, as suggested in Martin (2000) and Rindfuss *et al.* (1996), without model specifications. However, the impacts of women's education on the level of fertility depend on estimation methods and model specifications. Specifically, the estimated coefficients of SEND, provided in Models (E) and (G), are negative and statistically significant without estimation methods. Whereas the estimated coefficient of TERT in Model (F) is statistically significant at the 1 percent significance level, that of TERT in Model (H), which is accommodating a country's specific effect, is statistically insignificant at the conventional significance level. The reason why the difference in the estimated coefficients of TFR occurs will be examined after identifying the results of system equations.

In Table II, the impacts of MORT and FLP on TFR are positive and negative, respectively, and statistically significant without model specifications. The positive MORT coefficients imply that a country with a greater mortality rate results in a higher level of fertility rate. This observation is due to the fact that parents care not about the number of children who are born but about the number of children who survive to adulthood (Weil, 2009). Further, the negative impacts of FLP on TFR are presumably related to the fact that the opportunity costs of childbearing and rearing increase when women's employment enhances. However, the impacts of MORT and FLP on AFB are not robust; namely, the results depend on model specifications[7].

Estimation results using system equations are summarized in Table III. The results are very similar to those on the separate estimations. That is, women's education without the level of education is positively associated with AFB and negatively related to TFR. For instance, an increase in the TERT coefficient of a country by one standard deviation (26.34 points, see Table I) would lead to increases in the AFB of about 1.58 percentage points and decrease in the TFR of about 0.26 percentage points per year, respectively, in System (B), after controlling for MORT and FLP. In addition, the

Table II. Estimation results on separate equations

	Dependent variable: AFB				Dependent variable: TFR			
	Pooled LS		FE or RE		Pooled LS		FE or RE	
	Model (A)	Model (B)	Model (C)	Model (D)	Model (E)	Model (F)	Model (G)	Model (H)
Constant	19.98 (19.75)***	24.08 (42.65)***	19.48 (20.75)***	20.94 (17.73)***	4.56 (11.70)***	3.06 (10.38)***	5.21 (12.05)***	4.16 (8.96)***
SEND	0.07 (9.38)***		0.07 (9.06)***		−0.02 (−6.11)***		−0.02 (−4.49)***	
TERT		0.06 (7.88)***		0.06 (13.34)***		−0.01 (−3.41)***		−0.001 (−0.34)
MORT	−0.01 (−1.95)**	−0.02 (−7.91)***	−0.004 (−1.03)	−0.01 (−1.77)*	0.02 (8.26)***	0.02 (12.42)***	0.02 (11.33)***	0.02 (13.34)***
FLP	−0.01 (−1.28)	−0.02 (−1.80)*	−0.01 (−1.00)	0.02 (1.06)	−0.02 (−2.98)***	−0.02 (−3.08)***	−0.04 (−4.24)***	−0.05 (−4.91)***
R^2	0.71	0.71	0.63	0.96	0.81	0.79	0.96	0.96
Observations	198	184	198	184	330	277	330	277
χ^2[p-value]			3.00[0.392]	9.10[0.028]			8.62[0.035]	14.22[0.003]
FE/RE model			RE	FE			FE	FE

Notes: Dependent variable: mean age of women at first birth (AFB) around 1980, 1995, and 2005; and total fertility rate (TFR) in 1980, 1995, and 2005. *t*-statistics are provided in parentheses. In models using the pooled LS method, *t*-statistics are based on the White's heteroskedasticity-consistent standard errors and covariance. ***,**,*Significant at 1, 5, 10 percent levels, respectively

Table III. Estimation results on system equations

	System (A): SUR		System (B): SUR		System (C): 3SLS		System (D): 3SLS	
	AFB	TFR	AFB	TFR	AFB	TFR	AFB	TFR
Constant	19.86 (24.18)***	4.56 (17.14)***	23.92 (52.35)***	3.06 (17.72)***	17.17 (11.54)***	4.25 (6.84)***	23.34 (37.27)***	2.72 (10.47)***
SEND	0.07 (8.99)***	−0.02 (−8.07)***			0.10 (6.36)***	−0.02 (−2.47)**		
TERT			0.06 (9.12)***	−0.01 (−3.95)***			0.08 (5.40)***	0.003 (0.37)
MORT	−0.01 (−1.52)	0.02 (11.85)***	−0.02 (−8.59)***	0.02 (22.01)***	0.01 (1.10)	0.02 (5.49)***	−0.02 (−3.03)***	0.03 (12.26)***
FLP	−0.01 (−1.39)	−0.02 (−5.18)***	−0.02 (−1.77)*	−0.02 (−5.65)***	−0.02 (−1.78)*	−0.02 (−5.05)***	−0.03 (−2.59)***	−0.02 (−5.49)***
R^2	0.71	0.81	0.74	0.79	0.69	0.80	0.71	0.77
Observations	198	330	184	277	198	330	184	277

Notes: Dependent variable: mean age of women at first birth (AFB) around 1980, 1995, and 2005; and total fertility rate (TFR) in 1980, 1995, and 2005. *t*-statistics are provided in parentheses. Instrumental variables in systems (C) and (D) are constant, MOTR, FLP, population density, and urbanization ratio. ***,**,*Significant at 1, 5, 10 percent levels, respectively statistical significances of all estimated coefficients are considerable except the estimated coefficient of TERT on TFR in System (D) that is statistically insignificant. The signs and significances of other explanatory variables' (i.e. MORT and FLP) coefficients are similar to the cases of separate regressions in Table II.

The insignificance of the TERT coefficient in System (D) is the same as in the Model (H) in Table II. In other words, the impact of TERT on TFR is negligible when considering each country's specific effect or potential endogeneity between women's education and fertility rate. This observation can be explained by a non-liner relationship between women's education and fertility rate. Specifically, countries with higher levels of female TERT have generally higher levels of women's employment and income, and hence those countries improve institutional quality or form public policies that make women's employment compatible with childbearing and rearing[8]. These results suggest that the government's role is important to improve women's economic activity and fertility rate. That is, to reduce women's opportunity cost on child rearing, the government has to offer sufficient childcare services, or so-called work-family reconciliation policies (Evans, 2001; Nishimura, 2003). Alternatively, women's higher education extends their status and gender equality, as suggested in Basu (2002), which reduces the burdens of child birth. Hence, it is possible to have an insignificant effect of TERT on TFR in a cross-country analysis.

Therefore, regression results suggest that women's education certainly increases women's age at first birth: however, the impact of women's education on fertility rate depends on education levels and estimation methods. In other words, cross-country observation indicates that the female TERT may not be a factor for the fertility decline, which is in contrast to a prior expectation. Hence, it is necessary to examine the individual and joint effects of the female TERT and mean age of woman at first birth on TFR, which is a bit different from the consideration of this paper. This examination is a plausible topic for future study, and will complete the analysis of this study.

Finally, we have frequently observed that the empirical results are quite different according to sample selections. In addition, Table II and III indicate that the impacts of women's higher education, regarded as a luxurious good and mainly accompanied by rich countries, on fertility rate is statistically insignificant in some cases. To reduce the effect of income on fertility, this paper uses another sample that consists of non-OECD countries. In doing this, we also identify whether the regression results are robust to the sample selections. The methods of the multiple equation system, such as SUR and 3SLS, are used to estimate the sample of non-OECD countries, and the estimated results are summarized in Table IV.

In Table IV, the regression results are very similar to those in Table III, meaning that the impacts of women's education on the timing and level of fertility are robust to the sample selections. Indeed, the results certify a positive and significant association between women's education (both SEND and TERT) and AFB, and a negative and significant relationship between SEND and TFR. The estimated coefficient of TERT on TFR in System (D) is still statistically insignificant. The results of other explanatory variables are similar to the cases in Tables II and III.

Based on the findings, it is possible to conclude that a country with higher women's education is more likely to postpone the first birth without sample selections and estimation methods. In addition, the female SEND is negatively and significantly associated with fertility rate. However, cross-country observation indicates that women's higher education does not play a significant role in the decline of fertility rate when each country's specific effect or potential endogeneity are considered.

Table IV.
Estimation results on system equations: non-OECD countries sample

	System (A): SUR		System (B): SUR		System (C): 3SLS		System (D): 3SLS	
	AFB	TFR	AFB	TFR	AFB	TFR	AFB	TFR
Constant	22.14 (25.28)***	5.08 (15.31)***	23.64 (49.25)***	3.56 (16.38)***	18.28 (9.84)***	4.84 (5.14)***	22.56 (26.74)***	2.84 (6.69)***
SEND	0.03 (3.52)***	−0.03 (−7.37)***			0.08 (3.75)***	−0.02 (−2.03)**		
TERT			0.04 (4.52)***	−0.02 (−5.03)***			0.08 (3.36)***	0.01 (0.43)
MORT	−0.01 (−3.02)***	0.01 (8.88)***	−0.02 (−6.72)***	0.02 (15.90)***	0.01 (0.71)	0.02 (3.50)***	−0.01 (−1.89)*	0.03 (9.06)***
FLP	−0.02 (−2.65)***	−0.02 (−5.11)***	−0.02 (−2.53)**	−0.02 (−5.20)***	−0.02 (−2.26)**	−0.02 (−5.07)***	−0.02 (−2.87)***	−0.02 (−5.10)***
R^2	0.62	0.76	0.66	0.75	0.55	0.76	0.59	0.70
Observations	124	246	110	193	124	246	110	193

Notes: Dependent variable: mean age of women at first birth (AFB) around 1980, 1995, and 2005; and total fertility rate (TFR) in 1980, 1995, and 2005. *t*-statistics are provided in parentheses. Instrumental variables in systems (C) and (D) are constant, MOTR, FLP, population density, and urbanization ratio. ***,**,*Significant at 1, 5, 10 percent levels, respectively

V. Concluding remarks

Using cross-country evidence, this paper establishes the association between women's education and the timing (measured by "the mean age of women at first birth") and level (measured by "TFR") of fertility in 1980, 1995, and 2005. It is found that a higher women's education tends to delay of child birth or family formation. In addition, there exists a negative relationship between the female SEND and TFR, meaning that the opportunity costs of childbearing and rearing increases when the level of women's education enhances. However, we have also found that the impacts of women's higher education (measured by female TERT) on TFR is statistically insignificant in a few cases of estimations without sample selections. A plausible interpretation is that higher women's education increases their status and gender equality, which induces women's employment that is not incompatible with childbearing and rearing.

A number of issues remain for future study. First, it is possible to examine the individual and joint effects of women's higher education and women's age at first birth on fertility rate, as noted earlier, which will complete the analysis of this study. Second, women's education can be associated with women's employment and/or economic uncertainty (or labor market instability), and hence we can trace the above variables' relationships and the effects of those on fertility. Finally, it is worthwhile to induce the impact of women's education on the percentage of childless women and the individual and joint effects of those on fertility.

Notes

1. A number of studies have examined the endogenous relationships among women's employment, fertility, and economic growth (e.g. Barro and Becker, 1989; Becker and Barro, 1988; Becker *et al.*, 1990; Hondroyiannis and Papapetrou, 1999; Lee *et al.*, 2012; Wang *et al.*, 1994).
2. Let us note that Easterlin (1968) and Leibenstein (1975) introduced the concept of "relative income" to explain the determinations of fertility rate.
3. Recently, Blossfeld *et al.* (2005) stipulated that unstable employment situations, term-limited working contracts and youth unemployment are other reasons why young people postpone their first childbearing.
4. Data on each country's AFB are based on either registration or survey (see United Nations, 2011), and the available numbers of countries around 1980, 1995, and 2005 are 83, 105, and 107, respectively. However, the number of observations in the empirical analysis will be reduced due to the availability of other variables.
5. That is, the total number of countries that are used in at least one of the three years (1980, 1995, and 2005) is 156, and hence we use the cross-section of counties' unbalanced panel data.
6. Population density is calculated from the number of people in a square kilometer, and urbanization ratio denotes the urban population as a percentage of total population.
7. It is worthwhile to note a pertinent observation. To reflect a country's economic performance, "real GDP per capita (measured in US$)" is added as another independent variable in the same regressions. However, the results are not reported, because the estimated coefficients of women's education have the same signs but a bit reduced significances due to a multicollinearity problem.
8. The non-liner relationship between women's employment and fertility was highlighted in Matysiak (2008). In addition, Mammen and Paxson (2000) suggested that cross-country data showed an inverted U relationship between women's employment and income level.

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Corresponding author
Dr Jong Ha Lee can be contacted at: jhlee.eco@gmail.com