Does sector specific foreign aid matter for fertility? An empirical analysis form Pakistan

Ahmad, Khalil and Ali, Amjad and Irfan Chani, Muhammad

Ph.D. Scholar at National College of Business Administration Economics (NCBAE), Lahore, Pakistan, Ph.D. Scholar at National College of Business Administration Economics (NCBAE), Lahore, Pakistan, Assistant Professor and HOD Economics. The University of Lahore, Pakpattan, Pakistan

December 2014

DOES SECTOR SPECIFIC FOREIGN AID MATTER FOR FERTILITY? AN EMPIRICAL ANALYSIS FORM PAKISTAN

KHALIL AHMAD
Ph.D. Scholar at National College of Business Administration
& Economics (NCBA&E), Lahore, Pakistan
Cell No. 92 301 2238205
khalilahmad122@gmail.com

AMJAD ALI
Ph.D. Scholar at National College of Business Administration
& Economics (NCBA&E), Lahore, Pakistan
Cell No. 92 314 4575371
chanamjadali@yahoo.com

MUHAMMD IRFAN CHANI
Assistant Professor and HOD Economics.
The University of Lahore, Pakpattan, Pakistan
Cell No. 92 321 5260440
irfanchani@gmail.com

Abstract

In the light of previous literature fertility determines different economic, social and program inputs variables. The main object of this study to investigate the impact of sector specific (health and education) foreign aid on fertility in case of Pakistan. For empirical investigation Auto Regressive Distributed Lag Model (ARDL) is used over the period of 1973-2012. The results of the study show that sector specific foreign aid to health and education sector have negative impact on fertility rate in Pakistan. The results show that family planning program inputs are not enough to control population growth in Pakistan.

Key Words: Foreign aid, Fertility, population control programs,
JEL Classification: F35, I31, J11

I. INTRODUCTION

Pakistan is an interesting case study on the relationship of foreign aid and fertility due to two reasons, first Pakistan is receiving a bulk amount of foreign aid under the shed of social reforms to improve economic and social well-being of the society. Especially, inflow of foreign aid in education and health sector. A large number of empirical studies focus on better health and education reforms because both sectors play an important role to determine the socio-economic performance of the society. Secondly, from last four or five epochs the government of Pakistan lunched different population control programs. The most important among them is Family Planning Programs exertion with the help of Leady Health Visitor (LHVs). For the success of family planning program LHVs provide medicine, treatment, and knowledge sharing environment about population control at Basic Health Unit (BHUs). As following microeconomic household theory of fertility, people tend towards less number of children when they have better health and education facilities.

Schultz (1969), Schultz (1973) and Gertler and Molyneaux (1994) provided theoretical background how socio-economic behavior and program inputs impact on fertility. Foreign aid has dual impact on fertility, at micro level it may has positive relationship with fertility while at macro level it may has negative impact on fertility. On one hand, foreign aid in education sector means improve the literacy level of the couple regard demand for surviving children. On the other hand, foreign aid towards health sector can improve health infrastructure facilities and medication to children increase survival rate and couple demand for less children. In developing countries like Pakistan have poor infrastructure in health sector. The government of Pakistan has allocated less resources for education and health sector. If we reviewing pervious literature on the relationship of foreign aid and its impact on fertility, we find limited research work done by Sylwester (2008), Azarnert (2008), Azarnert (2009) and Cuberes and Kevin (2011) results show positive relationship between population growth and foreign aid.

Malthus (1798) discuss first economic model regarding population growth and income behavior in his population trap. According to neo-classical ideas of fertility describe different variables such as income level, women employment, child bearing opportunity cost and price level. Most theoretical work on the child demand behavior of consumer done by Backer (1960) Schultz (1973) and Easterlin (1976). Many economists such as Becker (1988, 1992), Becker and Barro (1988), Barro and Becker (1989), Ehrlich (1990), Becker et al. (1990), Ehrlich and Lui (1991), Wang et al. (1994), Zhang and Zhang (1997) and Yip and Zhang (1997) analysis the relationship between population growth and income growth. It is generally accepted that foreign aid has positive impact on economic growth especially in case of developing nations. Moreover, some studies linked some condition and environment (intensity of effectiveness with good public policy and favorable geographical conditions) for the success of aid and growth; for this to see Boone (1996) Burnside and Dollar (2000) Doucouliagos and Paldam (2008) and Rajan and Subramanian (2008). On the other hand, many less developed countries are still challenged the Malthusian trap. So, the high population growth has an adverse effect on their development process (Weil and Wilde, 2009).

After reviewing the studies on sectorial foreign aid and fertility done by Rosenzweig and Evenson (1977), Behrman and Rosenzweig (2002), Thiele et al. (2006), Mishra and Newhouse (2009), Baldacci et al. (2008), and Azarnert (2008). They conclude that multiple factors are responsible for fertility rate. While, the novelty of this study empirical investigate the impact of sector specific foreign aid (education and health) on fertility in case of Pakistan. Being developing country with high population growth rate, sector specific foreign aid may has negative impact on fertility in Pakistan. We used the time series data from 1973 to 2012 and employed Auto Regressive distributed Lag Model (ARDL) for co-integration among the variables of the model. Moreover, this paper also investigates the effectiveness of program input on fertility. So this study will be a healthy contribution towards respective literature.

II. THEORETICAL MODEL AND DATA SOURCES

Following the theoretical background of Schultz (1969), Schultz (1973) and Gertler and Molyneaux (1994), as there are so many socio-economic and cultural factors which are responsible to determine the fertility rate. For empirical analysis, it is difficult to measure or quantify some factors such as social and cultural in decision making behavior of fertility. However, some important factors are used to achieve our objectives

$$F_t = f(D_t, S_t, Ae_t, Ah_t, L_t) \quad (1)$$

$$F_t = \alpha + \beta_1 D_t + \beta_2 S_t + \beta_3 Ae_t + \beta_4 Ah_t + \beta_5 L_t + \varepsilon_t \quad (2)$$

Where: F_t = Child per women use as fertility rate, D_t= Development level or per capita income, S_t = secondary enrollment as a proxy for education level considered as important factor fertility, Ae_t = Sector specific foreign aid for education, Ah_t = Sector specific foreign aid for health, L_t = Total numbers of lady health works (LHVs) as proxy of family planning program inputs. Data on foreign aid for health and education sectors are taken form OECD's online data base Creditor Reporting System (CRS) that contains information on the sectorial allocation of aid[1]. For development level, data has taken from World Development Indicator 2012. Data for fertility, primary enrollment and lady health worker has been taken from Federal Bureau of Statistics published by Government of Pakistan 2012.

III. ECONOMETRIC METHODOLOGY

This paper follows the ARDL bounds testing approach for co-integration developed by Pesaran et al. (2001) to examine the long-run relationship among fertility, socioeconomic, sector specific foreign aid (health and education) and program inputs (number of lady health worker) variables in the case of Pakistan. This approach has advantage over the traditional approaches. First, the short and long-run coefficients are simultaneously estimated through simple reparametraization process. Second, it can be employ without limit of whether the variable are integrated of order zero *I(0)* or integrated of order one *I(1)*. Third, this method of co-integration is more appropriate for small sample data set. ARDL approach involves estimating the following unrestricted error correction model as follows:

$$\Delta F_t = \phi_{y0} + \pi_{y1} D_{t-1} + \pi_{y2} S_{t-1} + \pi_{y3} Ae_{t-1} + \pi_{y4} Ah_{t-1} + \pi_{y5} L_{t-1} + \sum_{i=1}^{p} \lambda_{iy} \Delta F_{t-i} + \sum_{j=0}^{p} \gamma_{iy} \Delta D_{t-j} + \sum_{i=0}^{p} \alpha_{iy} \Delta S_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{iy} \Delta Ae_{t-i} + \sum_{i=0}^{p} \delta_{iy} \Delta Ah_{t-i} + \sum_{i=0}^{p} \theta_{iy} \Delta L_{t-i} + \varepsilon_{1t} \quad (1.1)$$

$$\Delta D_t = \phi_{k0} + \pi_{k1} F_{t-1} + \pi_{k2} S_{t-1} + \pi_{k3} Ae_{t-1} + \pi_{k4} Ah_{t-1} + \pi_{k5} L_{t-1} + \sum_{i=1}^{p} \lambda_{ik} \Delta D_{t-i} + \sum_{j=0}^{p} \gamma_{ik} \Delta F_{t-j} + \sum_{i=0}^{p} \alpha_{ik} \Delta S_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{ik} \Delta Ae_{t-i} + \sum_{i=0}^{p} \delta_{ik} \Delta Ah_{t-i} + \sum_{i=0}^{p} \theta_{ik} \Delta L_{t-i} + \varepsilon_{2t} \quad (1.2)$$

[1] Amount of aid measure at current prices in million US Dollar
OECD, 2012. International Development Statistics. Online Database on Aid and Other Resource Flows. http//www.oecd.org/dataoecd/50/17/5037721.

$$\Delta S_t = \phi_{l0} + \pi_{l1} F_{t-1} + \pi_{l2} D_{t-1} + \pi_{l3} Ae_{t-1} + \pi_{l4} Ah_{t-1} + \pi_{l5} L_{t-1} + \sum_{i=1}^{p} \lambda_{il} \Delta S_{t-i} + \sum_{j=0}^{p} \gamma_{il} \Delta F_{t-j} + \sum_{i=0}^{p} \alpha_{il} \Delta D_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{il} \Delta Ae_{t-i} + \sum_{i=0}^{p} \delta_{il} \Delta Ah_{t-i} \sum_{i=0}^{p} \theta_{il} \Delta L_{t-i} + \varepsilon_{3t} \quad (1.3)$$

$$\Delta Ae_t = \phi_{g0} + \pi_{g1} F_{t-1} + \pi_{g2} D_{t-1} + \pi_{g3} S_{t-1} + \pi_{g4} Ah_{t-1} + \pi_{g5} L_{t-1} + \sum_{i=1}^{p} \lambda_{ig} \Delta Ae_{t-i} + \sum_{j=0}^{p} \gamma_{ig} \Delta F_{t-j} + \sum_{i=0}^{p} \alpha_{ig} \Delta D_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{ig} \Delta S_{t-i} + \sum_{i=0}^{p} \delta_{ig} \Delta Ah_{t-i} + \sum_{i=0}^{p} \theta_{ig} \Delta L_{t-i} + \varepsilon_{4t} \quad (1.4)$$

$$\Delta Ah_t = \phi_{q0} + \pi_{q1} F_{t-1} + \pi_{q2} D_{t-1} + \pi_{q3} S_{t-1} + \pi_{q4} Ae_{t-1} + \pi_{q5} L_{t-1} + \sum_{i=1}^{p} \lambda_{iq} \Delta Ah_{t-i} + \sum_{j=0}^{p} \gamma_{iq} \Delta F_{t-j} + \sum_{i=0}^{p} \alpha_{iq} \Delta D_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{iq} \Delta S_{t-i} + \sum_{i=0}^{p} \delta_{iq} \Delta Ae_{t-i} + \sum_{i=0}^{p} \theta_{iq} \Delta L_{t-i} + \varepsilon_{5t} \quad (1.5)$$

$$\Delta L_t = \phi s_0 + \pi_{s1} F_{t-1} + \pi_{s2} D_{t-1} + \pi_{s3} S_{t-1} + \pi_{s4} Ae_{t-1} + \pi_{s5} EAh_{t-1} + \sum_{i=1}^{p} \lambda_{is} \Delta L_{t-i} + \sum_{j=0}^{p} \alpha_{is} \Delta D_{t-j} + \sum_{i=0}^{p} \alpha_{is} \Delta S_{t-i}$$

$$+ \sum_{i=0}^{p} \beta_{is} \Delta F_{t-i} + \sum_{i=0}^{p} \delta_{is} \Delta Ae_{t-i} + \sum_{i=0}^{p} \theta_{is} \Delta Ah_{t-i} + \varepsilon_{6t} \quad (1.6)$$

Where, Δ show the difference operator; φ_{j0} is the constant, while, π_s explain the long-run impact; $\lambda, \gamma, \alpha, \beta, \delta, \theta$ represent short-run dynamics and ε_t is white noise error term. The optimal lag structure under ARDL approach is determined by estimating $(p+1)^k$ regressions for each equation, where p is the maximum number of lags and k is the number of variables in the equation. The optimal lag structure is determined by minimum value of Schwartz-Bayesian Criteria (SBC). This study used SBC lags structure method to confirm the optimal lag order.

The asymptotic distributions of the test statistics are non-standard regardless of whether the variables are *I(0)* or *I(1)*. Two separate bounds tests are available to examine the presence of long-run relationship among the variables of interest: a Wald or *F*-test for the joint null hypothesis $\pi_1 = \pi_2 = \pi_3 = \pi_4 = \pi_5 = 0$, (referred to as $F_F(F / D, S, Ae, Ah, L)$ for Equation 1.1) and Wald or *F* statistics for asymptotic distribution, for the critical bounds values provided by Pesaran et al. (2001). They computed two asymptotic critical values for lower and upper bounds. If F statistics value exceeds the upper bound then there is evidence of a long-run association. On the other hand, if the F statistic value is below or less then the lower bound, conclusion long run liner combination among variables. In addition, if the sample test statistic falls between these two bounds then the result is inconclusive. On the other hand, error correction method is used to investigate short run relationship among the variables of the models (Bannerjee et al. 1998). To examine the stability of the ARDL bounds testing approach to cointegration, stability tests namely CUSUM and CUSUMSQ have been applied (Brown et al. 1975).

The same process can be used when other variables are used as a dependent variable. Given the existence of long-run relationship among variables, an error correction representation can be developed as follows:[2]

$$(1-L)\begin{bmatrix} F \\ D \\ S \\ Ae \\ Ah \\ L \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \\ \alpha_5 \\ \alpha_6 \end{bmatrix} + \sum_{i=1}^{p}(1-L)\begin{bmatrix} b_{11i}b_{12i}b_{13i}b_{14i}b_{15i}b_{16i} \\ b_{21i}b_{22i}b_{23i}b_{24i}b_{25i}b_{26i} \\ b_{31i}b_{32i}b_{33i}b_{34i}b_{35i}b_{36i} \\ b_{41i}b_{42i}b_{43i}b_{44i}b_{45i}b_{46i} \\ b_{51i}b_{52i}b_{53i}b_{54i}b_{55i}b_{56i} \end{bmatrix} + \begin{bmatrix} \theta \\ \vartheta \\ \phi \\ \psi \\ \sigma \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{bmatrix} \quad (1.7)$$

where $(1-L)$ is the difference operator; ECT_{t-1} is the lagged error-correction term derived from above ARDL equations; and $\varepsilon_{1t}, \varepsilon_{2t}, \varepsilon_{3t}$ and ε_{4t} are serially independent error terms having mean zero and finite covariance matrix.

IV. EMPIRICAL RESULTS AND DISCUSSION

For finding the long run and short run co-integration among the variables of the model unit root test is pre-condition. For this we use Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Dickey-Fuller Generalized Least Square (DF-GLS) tests. The results of unit root tests are presented in the table I. The results of the ADF show that only economic development is stationary at level and all other variables are stationary at first difference. The same is repeated for PP unit root test but when we use DF-GLS all variables are stationary at first difference. So following the first two unit root tests we find there is mix order of integration among the variables of the model and most variables have 5 percent level of significance.

TABLE I
THE RESULTS OF UNIT ROOT TESTS

Variables	ADF	PP	DF-GLS
F_t	1.7165(3)	1.3690(4)	–1.4571(5)
ΔF_t	–2.4817(2)**	–2.5013(3)**	–4.2141(5)**
D_t	–6.9021(0)***	–4.2165(4)***	–1.3123(3)
ΔD_t	–1.2369(2)	–1.2059(3)	–2.6260(3)**
S_t	1.6921(0)	1.2007(3)	1.2340(1)
ΔS_t	–3.5831(1)**	–5.1045(3)**	–3.6530(1)**
Ae_t	0.5890(1)	0.9825(2)	1.0085(1)
ΔAe_t	-3.3309(1)**	-3.7479(1)**	-3.378(1)**
Ah_t	2.1923(1)	0.6046(4)	1.7360(1)
ΔAh_t	-6.1554(1)***	-2.3018(4)**	-3.9119(1)**
L_t	1.3674(2)	2.4096(2)	1.5020(1)

[2] If cointegration is not detected, the causality test is performed without an error correction term (*ECT*).

ΔL_t	-3.6974(1)**	-3.6983(2)**	-1.7340(1)

Note: The asterisks *** and ** denote the significant at %1 and 5% levels, respectively. The figure in the parenthesis is the optimal lag structure for ADF and DF-GLS tests, bandwidth for the PP unit root test is determined by the Schwarz Bayesian Criterion

The results for ARDL are presented in the panel-I of the table II. The results of the equation 1.1 show that F-statistic is greater than the upper bound so there is co-integration among the variables of the equation 1.1. The results of the equation 1.2 show that F-statistic is greater than the upper bound and there is co-integration among the variables of the equation 1.2. But in case of equation 1.3 and equation 1.4 F-statistic is less than both lower bound and upper bound so there is no co-integration among the variables. The results of the equations 1.5 and 1.6 also show that F-statistic is greater than the upper bound hence there is co-integration among the variable. The results show that all those equations which have co-integration among their variables have same 1 percent level of significance. The panel-II shows results of diagnostic tests for all six equations. The results show that all the equations except equations (1.3, 1.4) data is normally distributed and there is no problem of autocorrelation and heteroscedasticity. The results show that CUSUM and CUSUMSQ are stable which further verify the validity of the data.

TABLE II

RESULTS OF COINTEGRATION TEST

Panel I: Bounds Testing to Cointegration						
Estimated Eq.	1.1	1.2	1.3	1.4	1.5	1.6
Optimal Lag	[1,0,0,1,1,0]	[1,0,0,0,1,0]	[1,0,0,0,0,0]	[1,1,1,0,0,0]	[1,1,1,0,1,0]	[1,0,0,1,0,0]
F-Statistics	32.4815	42.697	2.4098	1.9447	71.8786	9.210
	Critical values (T,39)[#]					
	Lower bounds $I(0)$	Upper bounds $I(1)$				
99 % level	7.397	8.926				
95 % level	5.296	6.504				
90 % level	4.401	5.462				
Panel II: Diagnostic tests						
R^2	0.998	0.997	0.990	.995	.996	0.996
Adjusted-R^2	0.993	0.996	0.987	.994	.995	0.995
F-statistics	1725.0917***	3603.014***	512.200***	804.92***	242.173***	1419.1800***
J-B Normality	1.6330[.442]	11.3550[.003]	27.2419[.000]	3.8681[.049]	3.421[.148]	13.3535[.001]
LM (B.G)	1.7735 [0.1901]	.17251[.678]	3.3571[.067]	6.258[.002]	5.431[.034]	.38096[.537]
ARCH LM	0.8053 [0.4465]	1.420 [0.1241]	1.0689 [0.435]	8.325[.001]	7.001[.001]	1.2047 [0.1953]
White	.49977[.480]	.71086[.399]	2.8787[.090]	.0400[.841]	.54703[.460]	3.2130[.073]

Heteo						
RESET	17.5192[.000]	10.0494[.002]	1.3383[.247]	.6723[.412]	.62605[.731]	5.6322[.018]
CUSUM	Stable	Stable	Stable	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Unstable	Unstable	Stable	Stable

Note: The asterisks ***denotes the significant at 1% level. The optimal lag structure is determined by AIC. The parenthesis ( ) is the prob-values of diagnostic tests.

Critical values bounds computed by surface response procedure developed by Turner (2006).

After finding the co-integration among the variables of the study now we examine the long run results of the variables. The long results are presented in table III. The results show that economic development has negative and significant relationship with fertility rate in case of Pakistan. Secondary school enrollment has negative and insignificant relationship with fertility rate in Pakistan. For sector specific foreign aid results reveal that there is negative and relationship between foreign aid in health sector in Pakistan and fertility rate. This affirms that foreign aid toward health and education sectors improve health infrastructure and couple decision regarding demand for children in Pakistan. The number of lady health workers have positive and significant relationship with fertility rate in Pakistan. This shows that family planning program is not doing well in reducing fertility rate for Pakistan.

TABLE III

THE LONG RUN RESULTS

Dependent Variable = F_t

Variable	Coefficient	Standard Error	T statics [prob]
Constant	-5.3392	2.0750	2.5731[.016]
D_t	-0.84504	.23214	-3.6408[.001]
S_t	-0.45705	.27063	-0.0168[.987]
Ae_t	-0.59380	2.3207	-2.5588[.016]
Ah_t	-0.47155	5.5922	-0.8432[.406]
L_t	0.17233	.51204	3.3644[.002]
R-squared	0.9978		
Adjusted R-squared	0.9967		
F-statistics	1897.0738*		
Durbin-Watson	1.4635		
J-B Normality Test	1.9432 [0.3748]		
Breusch-Godfrey LM Test	0.3830 [0.4948]		
ARCH LM Test	1.4190 [0.2135]		
White Heteroskedasticity Test	1.6440 [0.1582]		
Ramsey RESET	0.6922 [0.4119]		

Note: * indicates significance at 1% and Prob-values are shown in parentheses

The short run dynamic of the study are presented in the table IV. The results show fertility rate has negative relationship with economic development, secondary school enrollment and foreign aid in Pakistan. On the other hand, foreign aid in health sector and lady health workers has positive and significant relationship with fertility rate in Pakistan. The value of ECM is negative and statistically significant. The negative value of

ECM is theoretically correct which shows the speed of convergence of the short run to the long run. The value of ECM shows that short run needs 7 year and 1 month to converge in the long run in case of Pakistan.

TABLE IV

ERROR CORRECTION REPRESENTATION FOR THE SELECTED ARDL MODEL

Dependent Variable = ΔF_t			
Variable	Coefficient	Standard Error	T statics [prob]
ΔD_t	-.11654	.54975	-2.1192[.042]
ΔS_t	-.63016	.37374	-0.0168[.987]
ΔAe_t	-.37133	.14568	-2.5490[.016]
ΔAh_t	1.73483	.77299	2.4774[.024]
ΔL_t	.23754	.53705	4.4225[.000]
ecm(-1)	-.13786	.043266	-3.1864[.003]
R-squared		0.8970	
Adjusted R-squared		0.8676	
F-statistics		40.0738*	

Note: * indicates significance at 1% and Prob-values are shown in parentheses

V. CONCLUSIONS

This study investigate the relationship of sector specific foreign aid and fertility with some socioeconomic, and family planning program inputs variables in case of Pakistan over the period of 1973-2011. The results shows that economic development and foreign aid for education has negative and significant impact on fertility rate in Pakistan. The results reveal that secondary school enrollment and foreign aid in health sector has negative and insignificant relationship with fertility rate. The number of Lady Health Workers (LHVs) have positive and significant relationship with fertility rate in Pakistan. This shows that family planning program is not appropriate to control fertility rate in Pakistan. The overall short run results show that foreign aid for health and family planning program have positive relationship with fertility. The results show that family planning program inputs are not enough to control population growth in Pakistan. For the policy implication government should improve the program inputs as well as transparent use of foreign aid in both sector.

REFERENCES

Azarnert, L.V. (2009). *Foreign Aid, Fertility and Population Growth: Evidence from Africa.* Working Papers 2009-12, Department of Economics, Bar-Ilan University.

Azarnert, L.V. (2008). Foreign Aid, Fertility and Human Capital Accumulation. *Economica,* 75, 766-781.

Baldacci, E., Clements, B., Gupta, S., and Cui, Q. (2008). Social spending, human capital, and growth in developing countries. *World Development*, 36(8), 1317-1341.

Banerjee, A., Dolado, J. J. and Mestre, R. (1998). Error-correction Mechanism Tests for Cointegration in a Single-Equation Framework. *Journal of Time Series Analysis, 19*, 267–83.

Barro, R. J. and Becker, G. S. (1989). Fertility Choice in a Model of Economic Growth. *Econometrica,* 57(2), 481-501.

Becker, G. S. (1988). Family Economics and Macro Behavior. *The American Economic Review*, 78(1), 1-13.

Becker, G. S (1992). Fertility and the Economy. *Journal of Population Economics*, 5(3), 185-201.

Becker, G. S (1960). *An Economic Analysis of Fertility.* Princeton, USA: Princeton University Press.

Becker, G. S. and Barro, R. J. (1988). A Reformulation of the Economic Theory of Fertility. *Quarterly Journal of Economics*, 103(1), 1-25.

Becker, G. S., Murphy, K. M. and Tamura, R. (1990). Human Capital, Fertility, and Economic Growth. *Journal of Political Economy*, 98(5), S12-S37.

Behrman, J.R. and M.R. Rosenzeig, (2002). Does Increasing Women's Schooling Raise the Schooling of the Next Generation? *The American Economic Review*, 92(1), 323-334.

Blackorby, C., Bosswort, W. and Donaldson, D. (1999). Foreign Aid and Population Policy: Some Ethical Considerations. *Journal of Development Economics,* 59, 203 – 237.

Boone, P. (1996). The Impact of Foreign Aid on Savings and Growth. *European Economic Review*, 40(2), 289–329.

Brown, R.L., Durbin, J., and Evans, J.M. (1975). Techniques for Testing of the Constancy of Regression Relationship over Time. *Journal of the Royal Statistical Society* B, 37, 149-192.

Burnside, C., and David, D. (2000). Aid, Policies, and Growth. *American Economic Review* 90 (4), 847–68.

Cuberes, D. and Kevin, T. (2011). *Aid and Fertility: What Does the Cross-Country Evidence Show?,* Working Papers 2011024, The University of Sheffield, Department of Economics.

Doucouliagos, H. and Paldam, M. (2008). Aid Effectiveness on Growth: A Meta Study. *European Journal of Political Economy,* 24, 1 – 24.

Easterlin, R. A. (1976). Population Change and Farm Settlement in the Northern United States. *The Journal of Economic History, 36*(1), 45-75.

Ehrlich, I. (1990). The Problem of Development: Introduction. *Journal of Political Economy*, 98(5), S1-S11.

Ehrlich, I. and Lui, F. T. (1991). Intergenerational Trade, Longevity, and Economic Growth. *Journal of Political Economy,* 99(5), 1029-1059.

Gertler, P.J. and J.W. Molyneaux, (1994). How Economic Development and Family Planning Programs Combined to Reduce Indonesian Fertility? *Demography*, 31(1), 33-42.

Malthus, T. R. (1798). *An Essay on the Principle of Population.* London: J. Johnson, in St. Paul's Church-yard.

Mishra, P. and D. Newhouse, (2009). Does Health Aid Matter? *Journal of Health Economics*, 28, 855-872.

Pesaran, M.H., Y. Shin and R. Smith, (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 1, 289-326.

Rajan, R and Subramanian, A. (2008). Aid and Growth: What Does the Cross-Country Evidence Really Show? *The Review of Economics and Statistics*, 90(4), 643–665.

Rosenzweig, M.R. and R. Evenson, (1977). Schooling and the Economic Contribution of Children of Rural India: An Econometric Analysis. *Econometrica*, 45(5), 1065-1079.

Schultz, T. P. (1973). Explanation of Birth Rate Changes over Space and Time: A Study of *Taiwan. Journal of Political Economy*, 81(2), S238-S274.

Schultz, T. P. (1969). An Economic Model of Family Planning and Fertility. *Chicago Journals*, 77(2), 153-0180.

Sylwester, K. (2008). Foreign Aid and Urbanization in Developing Countries. *International Journal of Business and Economics,* 7(2), 153-166.

Thiele, R., P. Nunnenkamp and A. Dreher, (2006). *Sectoral Aid Priorities: Are Donors Really Doing Their Best to Achieve the Millennium Development Goals*? Kiel Working Paper Series, Paper No. 1266. Kiel Institute of World Economics, Germany.

Wang, P., Yip, C. K. and Scotese, C. A. (1994). Fertility Choice and Economic Growth: Theory and Evidence. *The Review of Economics and Statistics*, 76(2), 255-266.

Weil, D. N., and Wilde, J. (2009). How Relevant Is Malthus for Economic Development Today? *American Economic Review*, 99(2), 255-60.

Wolf, S., (2007). Does Aid Improve Public Service Delivery? *Review of World Economics*, 143(4), 650-672.

Yip, C. K. and Zhang, J. (1997). A Simple Endogenous Growth Model with Endogenous Fertility: Indeterminacy and Uniqueness. *Journal of Population Economics*, 10(1), 97-110.

Zhang, J. and Zhang, J. (1997). Fertility and Wage Rates in an Overlapping-Generations Model. *The Canadian Journal of Economics*, 30(1), 224-234.