DECLINING FERTILITY ANDFINANCIAL DEVELOPMENT IN HIGH-INCOME AND LOW-INCOME COUNTRIES

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Abstract : In recent years, studies have found that financial development affect the rate of fertility worldwide. Available theories linking fertility and the banking sector have contended that when financial intermediaries develop the share of employment in the modern sector rises and the fertility rate falls. With a well-developed financial system, firms will have easy access to the credit market, thus, enhanced production efficiency and firm can raise wages in the modern market. Families have a choice to move from the traditional market (high fertility rate, low wages) to work in the modern sector (low fertility, high wages). On the hand, financial development can affect fertility by reducing the importance of the old-age security motive. Families' access to the credit market will renders current consumption less dependent on current income. If current income depends on the number of children that they have, then the development of a banking system would then reduce parents' optimal number of children. The purpose of the present study is to investigate the impact of financial development on fertility forselected developed and developing economies. In this study, we employ the fixed effects and random effects models using annual data ranges from 1980-2010. Our results suggest financial development affect fertility positively for the developed countries, but for the developing countries financial development adversely affecting fertility.

JEL classification: I15, J13, G20

Keywords: Fertility, Financial development, High-income country, Low-income country, anel data analysis.

1. INTRODUCTION

Birth rate and fertility rate have been declining world wide. The world's total fertility rates declined dramatically over the past five decades, falling on average from 5 children per women of child bearing age in 1960 to 2.5 in 2010. This figure is reaching the "replacement level" of 2.1, meaning that an average of 2.1 children

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per woman-two to replace the woman and her partner plus a little extra fertility to make up for children who do not live to reproductive age. In other words, a level of 2.1 would ensure the replacement of the previous generation and therefore ensure population stability.

The declining trend in fertility is becoming a serious issue, and if this fertility level is not sustained and allow to decline below the replacement level, population growth in manycountries will slow down and decline in the near future. Population decline reduces both domestic markets and domestic demand and impacted negatively on economic growth. Figure 1 clearly illustrates the declining total fertility rates between the rich and the poor countries. For the high income countries, its total fertility rate was below its replacement level since 1978; however, for the upper middle income countries, the total fertility rates falls below its replacement ratio starting from 1997. On the other hand, Figure 2 demonstratesthe trend in fertility according to the geographical regions. The total fertility rates for the Central Europe and the Baltics falls below its replacement level starting about 1989; East Asia and the Pacific in 1996; Europe and Central Asia in 1998; and the OECD countries in 1983.

Both figures suggest that fertility rates decline as economic development progress, and countries with higher economic developmentare associated with fertility rate below the replacement level. For example, in 2010, among the rich countries, the total fertility rate for France is 2.0, Germany 1.4, Spain 1.3, United
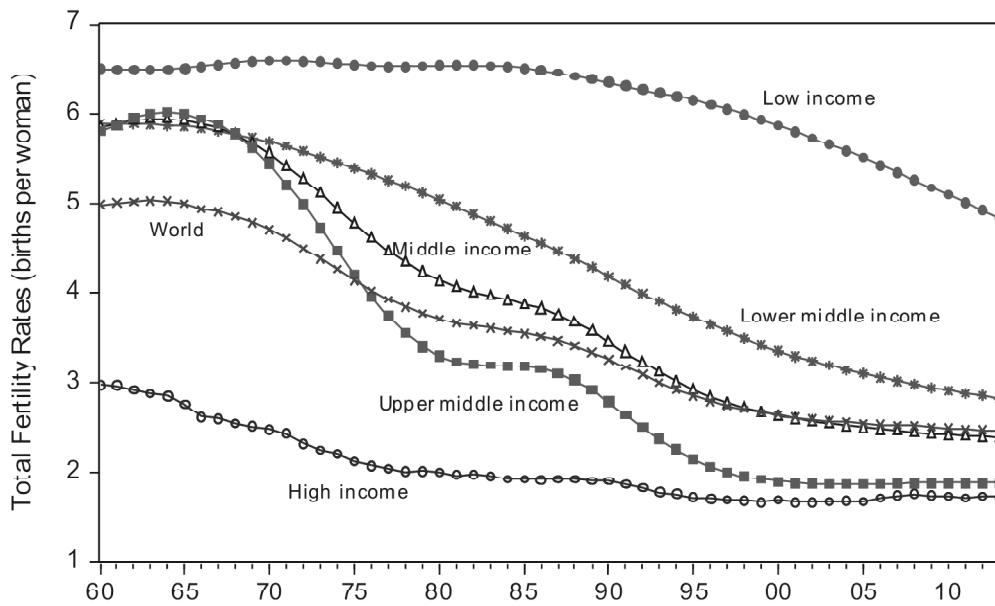

Figure 1: Trends in total fertility rates by high, middle and low income countries
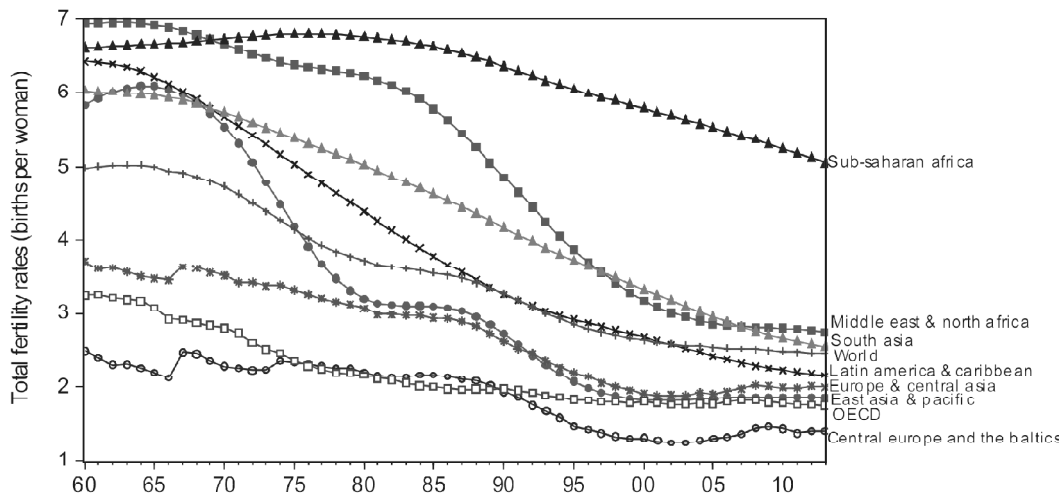
Figure 2: Trends in total fertility rates by geographical regions

Kingdom 1.9 and United States 1.9. On the other hand, in Asia, Japan total fertility rate is 1.4, Singapore 1.2, South Korea 2.0, and Hong Kong 1.1. According to Westley *et al*. (2010) if Japan, Singapore, and South Korea maintained the fertility rates below the replacement ratio, the population in these countries will eventually shrink by about one-third per generation, roughly every 30 years.The World Bank data base indicates that about more than 30% of the total countries are experiencing fertility rate below the replacement level in 2010. Countries experiencing fertility far below the replacement level will be burden with age imbalance in the population with older men and women becoming a much larger proportion of the total. On the other hand, the working-age men and women are being burden with financial support and personal care for the elderly. On the part of the government, they are worried about financing public pension and healthcare system.

Fertility declined is the price of economic development. Herzer *et al*. (2012) posit that in the process of economic development, an economy undergoes through two one-time transformations. First is an industrial revolution, characterised by a secular take-off of income per capita; and second a demographic transition, characterised by decreasing mortality and fertility rates. As a matter of fact, economists recognized that falling birth rates, ageing population and population decline are viewed as threats to economic growth. Never the less, recent studies have shown that declining population is not a worry for modern economies, where both declining population and sustained economic growth can coexist. Kosai *et al*. (1998) argue that changes and reforms in the labour market together with socioeconomic factors can mitigate the decline in fertility. Labour market

reforms that lead to job opportunities and wages between genders become more equal, the catching-up of women's wages to that of men's can coexist with the recovery of the fertility rate. Elgin and Tumen (2012) on the other hand, demonstrate that technology can play a role in sustaining economic growth with declining population. By shifting productive efforts toward human capital-oriented technologies that support ageing population can mitigate the impact of declining population on economic growth.

The purpose of the present paper is to investigate the effect of financial development on total fertility rates in both the developed and developing countries for the period 1980-2010. In this study, our focus is on the role of financial development as an important contributor for declining fertility. Our study concludes that financial development plays an important role in reducing fertility rate world wide.

The paper is organized as follows. In the next section we review some of the related literature on factors affecting fertility rates. In section 3, we discuss the model and method used to estimates the determinants of fertility. In section 4, we discuss the empirical results. The last section contains our conclusion.

2. REVIEW OF RELATED LITERATURE

There are several theories of fertility demographic transition to explain the declining trend in fertility over the decades (Mason, 1997). The classic transition theory suggests that the decline in fertility is the results in the changes in social life due to industrialization and urbanization. The outcome of economic development–urbanization and industrialization create a way of life in which having more than a few children is expensive enough to discourage most parents from having large family. The wealth flows theory proposes by Caldwell (1982) posit that parents weigh the economic benefit of rearing their children. When the net wealth transfer from children to parents is positive, parents are expected to desire more children because this will increase their wealth. On the other hand, when children consume more parental wealth than they provide, parents are expected to desire fewer children. Thus, following economic moder nization, fertility is reduced when the cost of upbringing the children is more than their returns.

Micro economic theory of fertility seeks to explain differences in fertility at the household level. According to Becker (1960) the fertility decisions made by a couple are conceptualized in terms of market choices. The theory stresses the demand for children and treats children as consumption goods. Couples have life time income restraints, and with in this context, they seek to maximize their

utility in regard to the number and quality of children they have and the quantity of other goods they consume. According to this model, if a couple's income increases, they will increase the number and quality of their children. On the other hand, the ideational theory propose by Cleland and Wilson (1987) attribute the timing of fertility transition to the diffusion of information and new social norms about birth control–the use of contraceptives, family planning program *etc*. The diffusion of ideas through social interactions and influence has been increasingly recognized to be associated with fertility declines (Mason, 1997).

Thus, based on the above theories, empirical studies have included variants of factors affecting fertility rate. Among others the determinants of fertility rate include: per capita real income, urbanization, female labour participation, education, infant mortality, life expectancy, poverty, sectoral employment, unemployment rate, maternity leave, population density, health expenditure, ratio of women to male wages, contraceptives and so on (see for example; Jeon *et al.*, 2010; Angeles, 2010; D'Addio and d'Ercole, 2005; Adsera, 2004; Narayan, 2006; Narayan and Peng, 2006; Masih and Masih, 1999, 2000).

Never the less, another strand of study relates fertility transition with the development of the financial sector. The proponents of this so-called old age security hypothesis (finance-fertility relation) believed that the fertility decisions will be incomplete if the role of financial development is ignored. First proposed by Neher (1971) and also Caldwell (1982), this hypothesis suggests that without access to the financial markets, children act as investment so that future income can be transfer to their parents during old-age since children are a form of life-cycle savings where parents invest when they are young and healthy and then expect their children to care for them in old age. How ever, the presence of social insurance and pension system allow the parents to invest in these institutions as future income during their old age is guaranteed, thus, having more or less number of children is an option. Financial development, there fore, can affect fertility behaviour by reducing the importance of the old-age security motive. As a consequence fertility rate is adversely affected with the development of the financial system (Guinnane, 2011). Recent analyses by Cigno *et al.* (2000) on Germany conclude that although social security is good for growth, but it adversely affect fertility. They posit that in the long-run, the declining trend in fertility will erode the system's own contributory base because it reduces the number of future contributors. On the other hand, Boldrin *et al.* (2005) demonstrate using United States and a number of European countries data that an increase in government provided old age pensions is strongly correlated with a reduction in fertility.

The development of the financial markets provides borrowing and investment opportunities. Filoso and Papagni (2015) argue that accessibility to the credit market induces parents to have more children. The ability to borrow funds from the financial markets renders current consumption less dependent on current income. Further more, as organised and diversified financial markets are more efficient that facilitates inter-temporal trade exchange; transactions and transfers are make easier and induce parents to have more children. On the other hand, if the presence of financial markets led parents to substitute out of children for old age support, then the development of financial markets reduces the demand for children. With financial development, financial institutions offers various financial instruments for savings and investments, as well as the financial markets offer pension plans and social security; these greatly reduce the need for parents to use children as vehicles for transferring income from their working life to retirement. Filoso and Papagni (2015) tested their hypothesis on 78 countries over the period 1995-2010, and found out that improved access to the credit market increases fertility, while fertility is adversely affected by the development in the capital markets.

Further empirical evidence that financial development affect fertility can be found in Basso *et al*. (2014), Cigno and Rosati (1992, 1996), Cigno (1993) and Rammohan (2001). In his study of extended family, Cigno (1993) contend that with out access to financial markets, parents lend to the children and are paid back in old age, thus, providing a model where family as a credit system. In this sense, the family is a substitute for the financial markets. Thus, the more the number of children, the more returns are expected in the future. How ever, when financial markets are accessible and provide assets with good returns, parents will reduce the number of children as an investment and turn to the financial markets as return from assets exceeds the return on children. In their empirical work, Cigno and Rosati (1992, 1996) found that financial development reduce the number of children per woman in Germany, Italy, UK and USA. On one hand, Ram mohan (2001) develop a two-period model incorporating both current and future benefits from children by linking with the development of financial capital markets, old-security and fertility, when child labour is prevalent. The model demonstrates that when returns from financial capital markets increase, fertility levels and investment in children's schooling are reduced. Basso *et al*. (2014) on the other hand, provide strong support that the availability and intensity of banking are related to lower fertility levels across North-eastern U.S. counties in the 19th century.

In another related study, Lehr (1999) argue that financial development can influence fertility and labour allocation decisions by raising market wages. Lehr

Table 1
List of countries used in the study

Developed countries (high income):	*Developing countries (low income):*
Canada	Benin
Cyprus	Burkina Faso
Finland	Burundi
France	Comoros
Germany	Congo, Democratic Republic
Ireland	Ethiopia
Japan	Guinea-Bisau
Korea, Republic	Kenya
Kuwait	Madagascar
Singapore	Malawi
Sweden	Mali
Switzerland	Niger
Trinidad and Tobago	Tanzania
United States	Togo
	Zimbabwe

Source: World Bank data base. http://data.worldbank.org/about/country-and-lending-groups.

(1999: 579) put forward that: "*an economy that develops financial structures (or experiences improvements in the delivery of financial intermediation services) will, in the long-run, experience a sectoral shift of labor out of the traditional sector and into the modern sector. The change in the labor allocation will be accompanied by a fall in the fertility rate which occurs not only because of the labor decisions, but also as a result of the higher wage rate. Thus, in a dynamic time-series sense, changes in financial intermediation should cause changes in fertility and employment shares.*"The model provide by Lehr (1999) predict that fertility falls as parents leave the traditional sector and choose the lower fertility rates of the modern sector parents. Higher wages in the modern sector provide as an incentive for employment to shift out of the traditional sector. This is possible because efficient financial markets provide cheap cost of borrowing and as a consequence raising wages in the modern sector. Using data on financial intermediaries, fertility and industrial employment share for 87 countries for the period 1965-1980, Lehr (1999) show that both financial intermediation and industrial employment impacted fertility negatively.

3. METHODOLOGY

Our aim is to investigate the effect of financial development on total fertility rate in both developed and developing countries. The data set consists of a pooled sample of 29 countries, comprising 14 high income countries and 15 low income countriescovering the period 1980-2010, depending on the availability of certain data, the panel set will be unbalanced. All data were collected from World

Development Indicators published by the World Bank and is available at http://data.worldbank.org/indicator/all. The list of countries is listed in Table 1.

The following simple fixed effects model is used to estimate the determinants of total fertility rate (TFR) across countries and across time:

$$\ln TFR_{it} = \alpha + \beta_j \ln FD_{ijt} + \theta \ln X_{it} + \varepsilon_{it} \qquad (1)$$

$$\varepsilon_{it} = v_i + \omega_{it} \qquad (2)$$

where α is the intercept, i and j denote country and indicators of financial development, respectively. v_i are country-specific, time-invariant effects, and ln denotes variables in logarithm. Since the fertility model as per Equation (1) in which we assume they are fixed over time, it is so-called the fixed effect model. The random effects model assumes in addition that $\varepsilon_{it} \approx i.i.d.$ $(0, \sigma\varepsilon^2)$, and $\omega_{it} \approx i.i.d.$ $(0, \sigma\varepsilon^2)$. These two error components are independent from each other. To check for any correlation between the error elements ε_{it} and the regressors in a random effects model we use a Hausman test. The test compares the coefficient estimates from the random effects model to those from fixed effects model. If both estimators are consistent then they should converge to the true parameter values $\beta's$ and $\theta's$ in large samples. On the other hand, if is correlated with any of the regressor the random effects estimator is inconsistent, while the fixed effects estimator remain consistent.

TFR is total fertility rate that measure the number of children per women in their productive lifetime. Our main explanatory variable is financial development, FD. According to the literature on finance-growth nexus, three measures of financial development commonly used are broad money M2 to GDP ratio (*BANKACCESS*), liquid liabilities to GDP ratio (*FINDEEP*), and market capitalization to GDP ratio (*STOCK*). A vector of control variables, *X*, included in this study are: real income measured by real gross domestic product (*RGDP*); female labour participation (*FEMALELABOR*); crude birth rate as percentage of 1,000 person (*BIRTH*); and population growth (*POP*). The full stochastic model for *TFR* is as follow;

$$\ln TFR_{it} = \alpha + \theta_1 \ln RGDP_{it} + \theta_2 \ln POP_{it} + \theta_3 \ln BIRTH_{it} + \theta_4 \ln FEMALELAB_{it}$$

$$+ \beta_1 \ln BANKACCESS_{it} + \beta_2 \ln FINDEEP_{it} + \beta_3 \ln STOCK_{it} + v_i + \varepsilon_{it}$$

It is expected *apriori* that, $\theta_1, \theta_2, \theta_4, \beta_2, \beta_3 < 0$, and $\theta_3, \beta_1 > 0$. The important role play by the financial sector is indicated by the parameters $\beta's$. Including more than one measures of the financial development indicators can be attributed to the work of Caporale *et al*. (2015), Hondroyiannis *et al*. (2005), and Deidda and Fattouh (2008). In this study, *BANKACCESS* is use to proxy for the availability and accessibility of the people towards banking services. Cigno and Rosati (1992: 331) note that: "*holding a bank account is the gateway to financial markets*

Table 2
Fixed effects and Random effects models for high-income countries

Variables	Fixed Effects Coefficient	Random Effects *p*-values	Coefficient	*p*-values
Constant	–0.5526 (0.4190)	0.190	–0.9529** (0.3716)	0.012
$lnRGDP_{it}$	0.0748 (0.0427)	0.083	0.1222** (0.0367)	0.001
$lnPOP_{it}$	–0.1034** (0.0466)	0.029	–0.1529** (0.0403)	0.000
$lnBIRTH_{it}$	0.1638** (0.1707)	0.000	0.1668** (0.0157)	0.000
$lnFEMALELAB_{it}$	0.2760** (0.0978)	0.006	0.3046** (0.0924)	0.001
$lnBANKACCESS_{it}$	0.4644** (0.0944)	0.000	0.3059** (0.0786)	0.000
$lnFINDEEP_{it}$	–0.5246** (0.0862)	0.000	–0.3753** (0.0701)	0.000
$lnSTOCK_{it}$	–0.0558** (0.0216) 136	0.011	–0.0865** (0.0166) 136	0.000
Within R^2	0.644		0.631	
Between R^2	0.696		0.786	
Overall R^2	0.626		0.648	
Hypothesis Testing:				
RE *vs* FE (Hausman test)	–		10.96	0.140
F-test	27.95**	0.000	236.21**	0.000

Notes: Figures in the parentheses are the standard errors. Asterisk ** denotesstatistically significant at 5% level.RE and FE denote random effects and fixed effects models, respectively.

generally because financial intermediation is carried out by ordinary banks rather than specialized institutions". Both Filoso and Papagni (2015) and Lehr (1999) argue that being able to access to financial market services, will open-up inter-temporal trade opportunities and thereby increase fertility. On the other hand, *FINDEEP* measure the depth of the financial intermediation sector, and *STOCK* measure the development of the stock market in a country. Both variables provide investment opportunities to the people and induce parents to reduce the number of children.

4. THE EMPIRICAL RESULTS

Two panel model specifications are estimated (shown in Tables 2 and 3)–the fixed effects and the random effects model–both of which are selected by the

Table 3
Fixed effects and Random effects models for low-income countries

Variables	Fixed Effects Coefficient	Random Effects p-values	Coefficient	p-values
Constant	3.8322** (0.2967)	0.000	2.8273** (0.2588)	0.000
$lnRGDP_{it}$	–0.3022** (0.0293)	0.000	–0.2454** (0.0248)	0.000
$lnPOP_{it}$	0.0023 (0.0084)	0.777	–0.0007 (0.0087)	0.932
$lnBIRTH_{it}$	0.4240** (0.0405)	0.000	0.4215** (0.0411)	0.000
$lnFEMALELAB_{it}$	–0.4183** (0.0481)	0.000	–0.2453** (0.0360)	0.000
$lnBANKACCESS_{it}$	–0.0408 (0.0296)	0.170	–0.0782** (0.0295)	0.008
$lnFINDEEP_{it}$	0.0108 (0.0302)	0.721	0.0453 (0.0302)	0.134
$lnSTOCK_{it}$		–	–	
N	236		236	
Within R²	0.675		0.655	
Between R²	0.663		0.769	
Overall R²	0.621		0.725	
Hypothesis Testing:				
RE *vs* FE (Hausman test)	–		11.86	0.065
F-test	74.91**	0.000	435.40**	0.000

Notes: Figures in the parentheses are the standard errors. Asterisk ** denotesstatistically
significant at 5% level.RE and FE denote random effects and fixed effects models,
respectively.

Hausman test which hypothesizes that the unobserved individual-level effects are modelled by random effects estimation. In both tables, the random effects model is selected based on the Hausman test that cannot reject the null hypothesis at the 5% level.

Table 2 reports the result for the factors affecting total fertility rates in the high income countries. Interestingly as shown in Table 2, all variables are significant at the 5% level. Our variable of interest, the financial development indicators–*BANKACCESS*, *FINDEEP* and *STOCK*–show a size able impact on fertility. For *BANKACCESS*, a 10% increase in the accessibility to the financial market, fertility rate increases by 3.1%. This result support the contention by Filoso and Papagni (2015) that access to organise and efficient financial market facilitates trade exchange and make transfers easier and should induce parents to have more children. On the other hand, *FINDEEP* and *STOCK* variables clearly

suggest a negative relationship with fertility rate. However, the impact of financial depth is greater that the impact of stock market on fertility. If old age hypothesis is true in the high income countries then *FINDEEP* and *STOCK* should capture this behaviour in which financial depth and stock markets provide alternative investment for the households during old age, thus reduces the demand for children. This result also support the second contention made by Filoso and Papagni (2015).

Turning to our control variables, real income, *RGDP* show positive sign suggesting that higher income in the high income countries lead to higher fertility rates. This implies that affluent societies are able to care for more number of children as well as invest in the quality of their children as their income is high enough. Increase in population growth (*POP*) lead to a fall in fertility. A 10% increase in population growth will lead to a 2% reduction in fertility rate. On the other hand, an increase in the birth rate (*BIRTH*) and female labour participation (*FEMALELAB*) in the high income countries increases the fertility rate rather than reduce fertility as expected. One possibility for a positive relationship between female labour participation and fertility is that in an affluent society, mothers or parents do not have to worry about caring for their children because they are able to spend and send their children to kid's nursery or day care centre during their working hours.

On the other hand, Table 3 shows the results for the factors affecting fertility in the low income countries. For the low income country we include both variables, *BANKACCESS* and *FINDEEP* in the model but exclude*STOCK*as this variable is not available for the low income countries. Financial depth (*FINDEEP*) variable is not significant, but variable *BANKACCESS* is significant at the 5% level. However, the improvement and accessibility to the financial markets give a negative impact on fertility in the low income countries. This implies that the accessibility to banking facilities or services do not facilitate trade rather financial market provides investment opportunities for the parents and substitute out of their children in the low income countries. According to Jeanneney and Kpodar (2008) financial development has a beneficial effect on the poor by offering opportunity of demand or savings deposits that provides positive returns for the poor households. Thus, accessibility to the financial markets acts as a vehicle to accumulate future income for their old age and as a consequence reduce the number of children. This finding is similar to Basso *et al*. (2014) in which they found that the availability of banking and banking intensity in 19th century U.S. counties are strongly associated with lower children-to-women ratios.

As for the control variables, only income (RGDP), rate of birth (BIRTH) and female labour participation (FEMALELAB) are significant at the 5% level and all show expected sign. The results suggest that in the low income countries, as

income increases parents invest in the quality of children rather than the quantity of children as predicted by Becker (1960). Further, as economic development progress so does the level of financial development and this give the opportunity for female employment in the modern sector.

5. CONCLUSION

In the present study we investigate the effect of financial development on total fertility rate for 14 high income countries and 15 low income countries using panel data analysis for the period 1980-2010. Available theories linking fertility and the banking sector have contended that when financial intermediaries develop the share of employment in the modern sector rises and the fertility rate falls. Further, financial development can affect fertility by reducing the importance of the old-age security motive. If current income depends on the number of children that they have, then the development of a banking system would then reduce parents' optimal number of children. Our results support the contention made by Filoso and Papagni (2015) that accessibility to an improved and organised financial market induce parents to have more children in the high income countries but not in the low income countries. The second contention made by Filoso and Papagni (2015) is that development in the financial markets reduces the demand for children are also supported in the high income countries but not in the low income countries.

References

Adsera, A. (2004), Changing fertility rates in developed countries: The impact of labor market institutions. *Journal of Population Economics*, 17, 1-27.

Angeles, L. (2010), Demographic transitions: Analyzing the effects of mortality on fertility. *Journal of Population Economics*, 23, 99-120.

Basso, A., Bodenhorn, H. and Cuberes, D. (2014), Fertility and financial development: Evidence from U.S. counties in the 19th century. NBER Working Paper 20491, Cambridge: National Bureau of Economic Research.

Becker, G.S. (1960), An economic analysis of fertility. Reprinted in G.S. Becker. (1976), *The Economic Approach to Human Behavior*. Chicago: The University of Chicago Press.

Boldrin, M., De Nardi, M. and Jones, L.E. (2005), Fertility and social security. Research Department Staff Report 359, Federal Reserve Bank of Minneapolis, Minneapolis, USA.

Caldwell, J.C. (1982), *Theory of Fertility Decline*. London: Academic Press.

Caporale, G.m., Rault, C., Sova, A.D. and Sova, R. (2015), Financial development and economic growth: Evidence from 10 new European Union members. *International Journal of Finance & Economics*, 20, 48-60.

Cigno, A. (1993), Intergenerational transfers without altruism: Family, market and state. *European Journal of Political Economy*, 9(8), 505-518.

Cigno, A., Casolaro, L. and Rosati, C.F. (2000), The role of social security in household decisions: VAR estimates of saving and fertility behaviour in Germany. CESifo Working Paper No.394, Center for Economic Studies (CES)-the Ifo Institute, Munich, Germany.

Cigno, A. and Rosati, F.C. (1992), The effects of financial markets and social security on saving and fertility behaviour in Italy.*Journal of Population Economics*, 5, 319-341.

Cigno, A. and Rosati, F.C. (1996), Jointly determined saving and fertility behaviour: Theory and estimates for Germany, Italy, UK and USA.*European Economic Review*, 40, 1561-1589.

Cleland, J. and Wilson, C. (1987), Demand theories of the fertility transition: An iconoclastic view. *Population Studies*, 41(1), 5-30.

D'Addio, A.C. and d'Ercole, M.M. (2005), Policies, institutions and fertility rates: A panel data analysis for OECD countries. *OECD Economic Studies*, 9(2), 7-45.

Deidda, L. and Fattouch, B. (2008), Banks, financial markets and growth.*Journal of Financial Intermediation*, 17, 6-36.

Elgin, C. and Tumen, S. (2012), Can sustained economic growth and declining population coexist? *Economic Modelling*, 29, 1899-1908.

Filoso, V. and Papagni, E. (2015), Fertility choice and financial development. *European Journal of Political Economy*, 37, 160-177.

Guinnane, T.W. (2011), The historical fertility transition: A guide for economists. *Journal of Economic Literature*, 49(3), 589-614.

Herzer, D., Strulik, H. and Vollmer, S. (2012), The long-run determinants of fertility: One century of demographic change 1900-1999. *Journal of Economic Growth*, 17, 357-385.

Hondroyiannis, G., Lolos, S. and Papapetrou, E. (2005), Financial markets and economic growth in Greece, 1986-1999.*Journal of International Financial Markets, Institutions and Money*, 15, 173-188.

Jeanneney, S.G. and Kpodar, K. (2008), Financial development and poverty reduction: Can there be a benefit without a cost? IMF Working Paper WP/08/62. New York: International Monetary Fund.

Jeon, Y., Rhyu, S.Y. and Shields, M.P. (2010), Fertility in Sub-Saharan African countries with consideration to health and poverty.*African Development Review*, 22(4), 540-555.

Kosai, Y., Saito, J. and Yashiro, N. (1998), Declining population and sustained economic growth: Can they coexist? *American Economic Review Papers and Proceedings*, 88(2), 412-416.

Lehr, C.S. (1999), Banking on fewer children: Financial intermediation, fertility and economic development.*Journal of Population Economics*, 12, 567-590.

Masih, A.M.M. and Masih, R. (1999), Is a significant socio-economic structural change a pre-requisite for 'initial' fertility decline in the LDCs? Evidence from Thailand based on a multivariate cointegration/vector error correction modelling approach. *Journal of Population Economics*, 12, 463-487.

Masih, A.M.M. and Masih, R. (2000), The dynamics of fertility, family planning and female education in a developing economy. *Applied Economics*, 32, 1617-1627.

Mason, K.O. (1997), Explaining fertility transition. *Demography*, 34(4), 443-454.

Narayan, P.K. (2006), Determinants of female fertility in Taiwan, 1996-2001: Empirical evidence from cointegration and variance decomposition analysis. *Asian Economic Journal*, 20(4), 393-407.

Narayan, P.K. and Peng, X. (2006), An econometric analysis of the determinants of fertility for China, 1952-2000. *Journal of Chinese Economic and Business Studies*, 4(2), 165-183.

Rammohan, A. (2001), Development of financial capital markets and the role of children as economic assets. *Journal of International Development*, 13, 45-58.

Westley, S.B., Choe, M.K. and Retherford, R.D. (2010), Very low fertility in Asia: Is there a problem? Can it be solved? *Asia Pacific Issues*, 94(May), 1-12.

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