

FERTILITY RATE AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES

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Introduction

The demographic transition from high mortality and high fertility to low mortality and low fertility is well underway around the world. There is evidence that the decline in fertility, which accompanies the latter stages of the demographic transition, creates the potential for a demographic dividend and a window of opportunity for economic growth. In addition to the increase in income from the decline in youth dependency rates and the rise in working-age share of the population, the decline in fertility promotes changes in behavior that can lead to higher income. Lower fertility can induce higher labor force participation rates, particularly for women. Reduced youth dependency rates may also lead to increased investment in the health and education of each child, thereby increasing children's productivity when they enter the workforce. Changes in fertility and age structure may affect national savings rates and investment. Finally, there may also be a positive feedback effect between the demographic and economic transitions, whereby fertility decline induces improvements in health, education, female labor market participation, and economic growth, and these improvements in turn lead to further reductions in fertility and additional economic benefits.

An important transition in the economic history of countries occurs when they move from a regime of low prosperity, high child mortality and high fertility to a state of high prosperity, low child mortality and low fertility. Researchers have proposed various theories to explain this demographic transition and its relation to economic growth. The relationship between the other socio-economic indicators is more complicated. Exogenous child mortality decline should lead to a fertility decline as women have fewer children if they know the chance of their survival is high (Kalemli-Ozcan, 2002). But there are many caveats due to specific factors (Ben-Porath, 1976; Barro, 1991; Haines, 1998). For instance, if the loss of a child affects the mother's health, there may be a subsequent fertility decline following from a child mortality increase (Rutstein and Medica, 1978). Moreover, families make sequential fertility choice decisions, accounting for the gender and health of surviving children, before choosing to have more children (Sah, 1991; Wolpin, 1997).

Population

The population is one of the most important factors in economic growth and the speed of its growth determines its size. Weil (2013) questions the relationship between rapid population growth and poverty, stating that "rapid population growth causes a country to be poor, that

something about being poor leads to rapid population growth, or that causality runs in both directions” (p.103). However, Rohwer (1999) points out that that a country's working-age population growth and its decisive effect on the country's economic growth speed is more than any other factors.

A demographic transition leads to a change in the supply and demand of labor, thus affecting the labor market. Labor is the primary element in producing output, and therefore, the population change will have an impact on economic growth. Recent work has resolved the population growth into its fertility and mortality components, and researchers have subsequently examined their independent effects on economic growth (Bloom & Williamson, 1997).

Economic Growth

Economic growth might also directly influence fertility decisions. In the classic Barro–Becker model (Becker, 1981; Barro and Becker, 1989), fertility choice is due to opportunity costs as increased wages for women result in less time spent on child bearing and childrearing. The Barro–Becker model has been highly influential and extended by others (Tamura, 1996; Strulik, 2004). Empirically its predictions are confirmed for Swedish fertility data (Eckstein et al., 1999), which show that two-thirds of fertility decline can be explained by child mortality decline and the remaining one-third can be explained by increase in wages. More broadly, using a quality–quantity trade-off model, Kögel and Prskawetz (2001) and Tamura (2002) show that an endogenous switch from an agricultural to a manufacturing economy has implications for fertility, which explains the coincidence of industrialization with fertility and mortality declines in countries.

Fertility

Fertility is a complex phenomenon, and its determinants are difficult to define. Finding a single complete theory of fertility is almost impossible. After all, fertility is influenced by both social and biological behaviours, socially linked to numerous socioeconomic and sociocultural factors, and biologically dependent on evolutionary antecedents and physiological constraints (McNicoll 1980: 441). Throughout history, economic development has been accompanied by a decrease in fertility (Doepke 2004; McNicoll 1980; Bongaarts 2008; Anderson and Kohler 2015). The twentieth century, for example, experienced significant rates of economic growth and a substantial decline in fertility (Bryant 2007). Since 1960, the Total Fertility Rate (TFR)⁴ has dropped from 3.3 births per woman in 1960 to 2.5 in 2012 (WDI 2015). Projections by the United Nations have found that the TFR of countries in economic transition will decrease to slightly below replacement level (Bongaarts 2008). Over the past 60 years, the negative association between economic development and fertility has been one of the most solidly accepted empirical regularities in the economic and social sciences. Many studies during this time have attempted to explain this negative association—known as demographic transition—from a variety of theoretical, ideological and disciplinary perspectives, including biology, sociology and economics (Anderson and Kohler 2015; Galor and Weil 2000; Lesthaeghe 1995; Kirk 1996; Caldwell 1976, among others).

Review of Literature

In the economic literature, two basic types of theories have been developed to explain fertility decline: cultural and structural theories. The former include Diffusionist and Innovation theories, which focus on the emergence and spread of new ideas, values and techniques for limiting fertility. The latter include Socioeconomic and Demand theories, which focus on changing social and economic conditions that motivate couples to limit their fertility, such as increased income, higher education level and women's increasing participation in the labour market (De Lange et al. 2014; Bryant 2007). The best-known structural theory is the Microeconomic Household Model, which argues that increased income reduces fertility in modern societies because it produces a substitution effect against the number of children in favour of the quality per child—essentially, more investment in individual human capital. Households choose to have fewer children in order to give each child more education (Becker 1960, 1981; Becker et al. 1990).

The impact of fertility choice decisions at the individual level on country-level economic growth have proved difficult to quantify. Cigno (1998) proposed that at low development “death-reducing public expenditures are most effective”, but at high development these “crowd out parental expenditures and result in fertility decline”. However, Kalemli-Ozcan (2002, 2003) shows that the importance of fertility choice under uncertainty of child survival could explain empirical observations of the demographic transition of a wide range of countries. Moreover, Strulik (2004) suggests that child quality expenditures can initiate economic take-offs and result in perpetual growth, while its absence may cause economic stagnation with high fertility. Similarly, Galor (2005) and co-workers (Galor and Weil, 1996,1999; Galor and Moav, 2002) suggest that the quality–quantity trade-off is endogenously triggered by technological progress, which leads to an increase in returns to education.

In spite of the insights that theoretical models bring, discussions about the underlying mechanisms tend to be “open-ended”(Brocket al., 2007). It is not clear if alternative models may fit observations better. On the other hand, the econometrics approach advocated by Durlauf et al.(2005) and Brocket al.(2007) focuses primarily on economic growth and includes the demographic transition only insofar as it impacts this growth. For instance, in the Barro regressions literature (Barro, 1991), life expectancy (which increases with exogenous child mortality decline) is an important covariate of economic growth. Similarly,using a Bayesian approach and a large number of covariates, Sala-i Martin (1997), Fernandez et al.(2001) and Ley and Steel(2009), among others, study the causes of economic growth with some thoroughness and show the importance of life expectancy(and, by implication, child mortality) in explaining economic growth in countries. However, these analyses ignore non-linearities and the complex interactions that are essential features of the process.

Income and fertility

Income and fertility is the association between monetary gain on one hand, and the tendency to produce offspring on the other. There is generally an inverse correlation between income and the total fertility rate within and between nations. The higher the degree of education

and GDP per capita of a human population, subpopulation or social stratum, the fewer children are born in any industrialized country. In a 1974 UN population conference in Bucharest, Karan Singh, a former minister of population in India, illustrated this trend by stating "Development is the best contraceptive. Herwig Birg has called the inverse relationship between income and fertility a "demo-economic paradox". Evolutionary biology dictates that the more successful individuals, or in this case countries, would seek to develop optimum conditions for their life and reproduction. However, in the last half of the 20th Century it has become clear that the economic success of developed countries is being counterbalanced by a demographic failure (that is, a below replacement fertility rate) that may prove destructive for their future economies and societies.

Causes and related factors

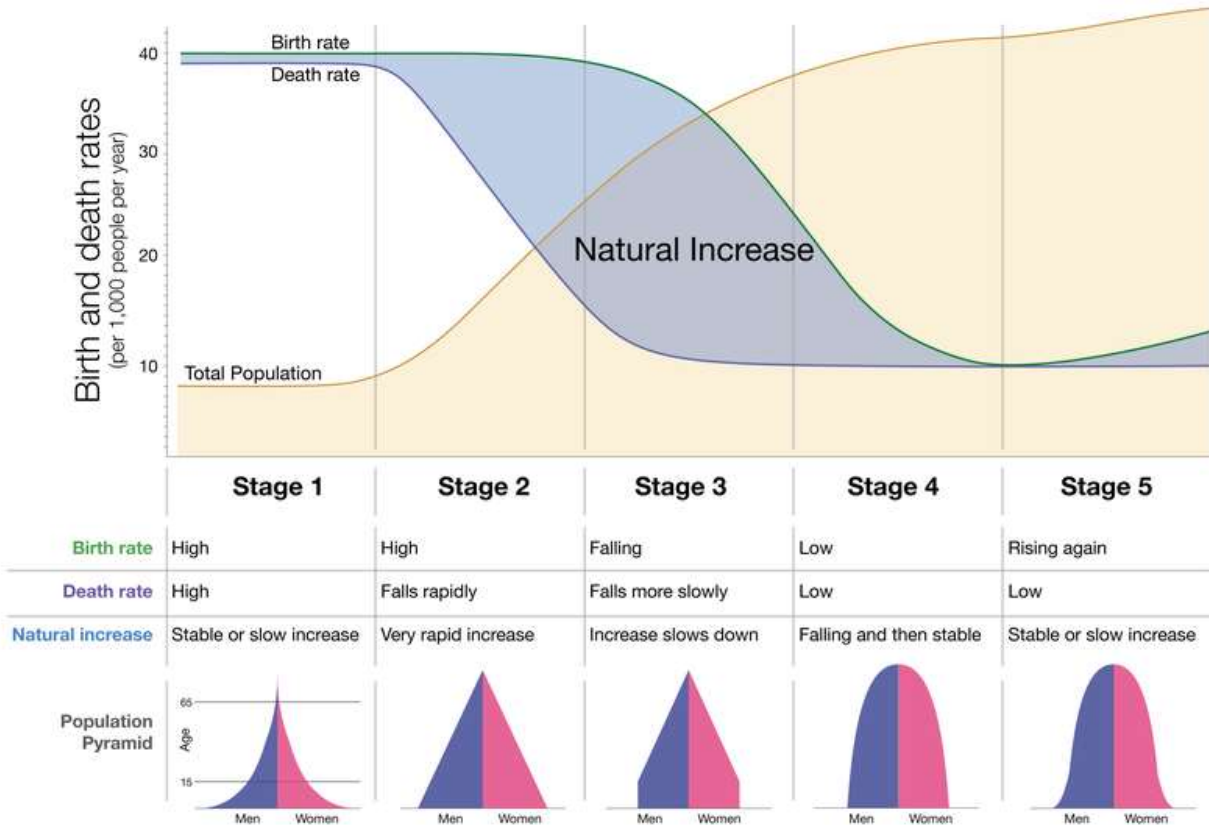
Coale's Three Preconditions for Decline in Fertility comes from the saying, "ready, willing and able". Societal changes may induce fertility declines, but they will do so only if three preconditions are met: ready, willing and able. A person and the population must have a reason to want to limit fertility. If people have economic and social opportunities that make it advantageous to limit fertility they will be more willing to limit it. There must be economic and psychosocial costs involved such as the cost of birth control or abortions. It is hypothesized that the observed trend in many countries of having fewer children has come about as a response to increased life expectancy, reduced childhood mortality, improved female literacy and independence, and urbanization that all result from increased GDP per capita, consistent with the demographic transition model. The increase in GDP in Eastern Europe after 1990 has been correlated with childbearing postponement and a sharp decline in fertility. In advanced countries where birth control is the norm, increased income is likewise associated with decreased fertility. Theories behind this include:

- People earning more have a higher opportunity cost if they focus on childbirth and parenting rather than their continued career
- Women who can economically sustain themselves have less incentive to become married.
- Higher-income parents value quality over quantity and so spend their resources on fewer children.
- Religion sometimes modifies the effect; higher income is associated with slightly increased fertility among Catholic couples but associated with slightly decreased fertility among Protestant couples.

Across countries, there is a strong negative correlation between Gross domestic product and fertility, and ultimately it is proven that a strong negative correlation exists between household income and fertility. A reduction in fertility can lead to an aging population, which can lead to a variety of problems. See for example the Demographics of Japan. A related concern is that high birth rates tend to place a greater burden of child rearing and education on populations already struggling with poverty. Consequently, inequality lowers average education and hampers economic growth. Also, in countries with a high burden of this kind, a reduction in fertility can hamper economic growth as well as the other way around. Richer countries have a lower fertility rate than poorer ones, and high income families have fewer kids than low-income

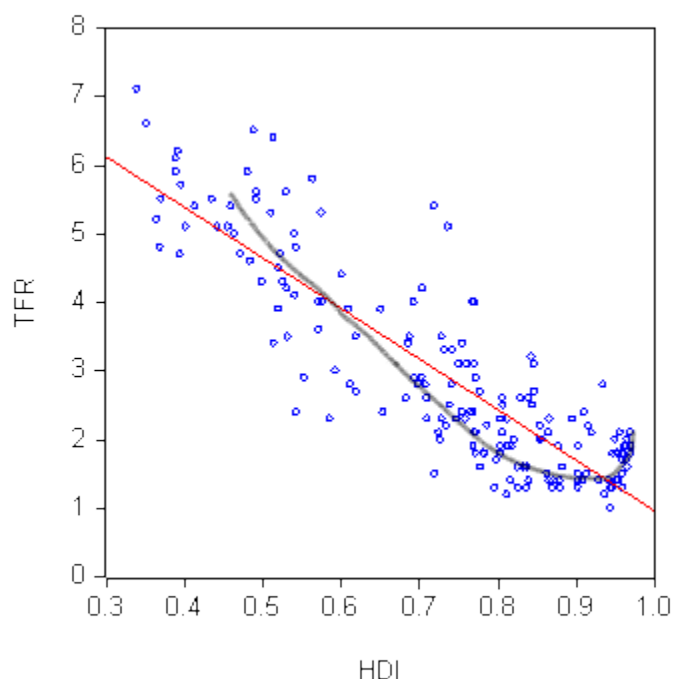
ones. Generally, a developed country has a lower fertility rate while a less economically developed country has a higher fertility rate. For example, the total fertility rate for Japan, a more developed country, with per capita GDP of \$32,600 in 2009, was 1.22 children born per woman. But total fertility rate in Ethiopia, with a per capita GDP of \$900 in 2009, was 6.17 children born per woman.

Demographic Change in five stages



A United Nations report in 2002 came to the conclusion that sharp declines in fertility rates in India, Nigeria, and Mexico occurred despite low levels of economic development. Every country could differ in their respective relationship between income and fertility. Some countries show that income and fertility are directly related but other countries show a directly inverse relationship. Increased unemployment is generally associated with lower fertility. A study in France came to the result that employment instability has a strong and persistent negative effect on the final number of children for both men and women and contributes to fertility postponement for men. It also came to the result that employment instability has a negative influence on fertility among those with more egalitarian views about the division of labor but still a positive influence for women with more traditional views. Fertility declines have been seen during economic recessions. This phenomenon is seen as a result of pregnancy postponement, especially of first births. However, this effect can be short-term and largely compensated for during later times of economic prosperity. Two recent studies in the United States show, that in some circumstances, families whose income has increased will have more children.

Fertility J-curve



Some scholars have recently questioned the assumption that economic development and fertility are correlated in a simple negative manner. A study published in *Nature* in 2009 found that when using the Human Development Index instead of the GDP as measure for economic development, fertility follows a J-shaped curve: with rising economic development, fertility rates indeed do drop at first but then begin to rise again as the level of social and economic development increases while still remaining below the replacement rate. In an article published in *Nature*, Myrskylä et al. pointed out that “unprecedented increases” in social and economic development in the 20th century had been accompanied by considerable declines in population growth rates and fertility. This negative association between human fertility and socio-economic development has been “one of the most solidly established and generally accepted empirical regularities in the social sciences”. The researchers used cross-sectional and longitudinal analyses to examine the relationship between total fertility rate (TFR) and the human development index (HDI). The main finding of the study was that, in highly developed countries with an HDI above 0.9, further development halts the declining fertility rates. This means that the previously negative development-fertility association is reversed; the graph becomes J-shaped. Myrskylä et al. contend that there has occurred “a fundamental change in the well-established negative relationship between fertility and development as the global population entered the twenty-first century”. Some researchers doubt J-shaped relationship fertility and socio-economic development (Luci and Thevenon, 2010; Furuoka, 2009). For example, Fumitaka Furuoka (2009) employed a piecewise regression analysis to examine the relationship between total fertility rate and human development index. However, he found no empirical evidence to support the proposition that advances in development are able to reverse declining fertility rates. More

precisely, the empirical findings of Furuoka's 2009 study indicate that in countries with a low human development index, higher levels of HDI tend to be associated with lower fertility rates. Likewise, in countries with a high human development index, higher levels of HDI are associated with lower fertility rates, although the relationship is weaker. Furuoka's findings support the "conventional wisdom" that higher development is consistently correlated with lower overall fertility.

Conclusion

In tracing the recent history of theory and research on the connection between demography and economics, we find a new consensus is emerging; that reductions in fertility and declining ratios of dependent to working age populations provide a window of opportunity for economic development and poverty reduction. Empirical studies increasingly support the idea that countries which have incorporated population policies and family planning programs in their overall economic development strategies have achieved high and sustained rates of economic growth and that they have also managed significant reductions in poverty. Fertility reduction is by no means an economic development panacea and is certainly not a sufficient condition for economic growth, but it may well be a necessary condition, establishing conditions in which governments can invest more per capita in education and health, thus creating the human capital for sustained economic growth. Likewise, with fewer children to care for and raise, families can improve their prospects for escaping the poverty trap. At both the macro- and micro-levels, moderating fertility enhances economic prospects. Throughout the developing world, declining birth rates and rising living standards have gone hand in hand. The evidence suggests that the interrelationship between them represents a virtuous circle, whereby improvements in one reinforce and accelerate improvements in the other. The virtuous circle can be initiated either by investing in human development programs such as healthcare and education or by investing in programs to reduce fertility.

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