Population Growth and Economic Development: An Islamic Perspective

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Abstract

This paper aims to develop an Islamic theoretical framework for the relationship between population growth and economic development. In this regard, a new version of the Neoclassical production function will be developed in a manner that conforms with the Islamic framework of the relationship between inputs and the expected output in the presence of technological improvement supported by the blessing of Allah as a reward for good believers who show perfect faith and fear of Allah Almighty. The paper concluded that Muslim nations should not take a passive attitude toward technological improvements; Instead, Muslim societies should strive at making an efficient use of their endowed resources by acquiring the most developed science and technology base. Meanwhile, Muslim societies are urged to maintain their eligibility for Allah's blessings through a steady faith, fear of Allah as a prerequisite for success as Allah has guaranteed societies of good believers an ever-growing per capita real income, and a sustained economic development regardless of its rate of population growth.

***Keywords**:* Population Growth, Economic growth, Cobb-Douglas production function, Elasticity.

1. Introduction

In the years following World War II, most of third world newly independent countries have chosen planning techniques as a mean to achieve economic development. Planners in densely populated countries, adopted a variety of strategies aimed against high rates of population growth, which was believed to be the major barrier to economic development in these countries. That argument had received strong support from economic demographers in light of the simple mathematical form of real per capita income (RGDP/Population), a traditional indicator of economic development, to show that the greater the population size the smaller the real per capita income, and the lower the level of economic development. The clear weakness of this argument lies in its implicit assumption that population growth has no effect on the level of real output, which is an apparent fallacious thinking. The paper proceeds in the following manner: after this introduction, the second section presents a brief review of previous studies. The third section presents the mathematical Neoclassical Growth Model, and then comes the major contribution of the paper in the fourth section devoted to the derivation of a revised form of the Cobb-Douglas production function, incorporated into the Neoclassical Growth Model and used in verifying the relationship between population growth and economic development from an Islamic perspective.

2. Review of Previous Studies

Contemporary economic demographers' according to Gelbach and Prichett (1995) formulation of Malthus' pessimistic theory, which states that while world population is increasing according to a geometric series, the growth of food production follows a numeric series as a result of decreasing returns to lands. According to his view, this situation will inevitably end up with massive famines and wars on food. Dasgubta (1995) based on David Ricardo (1815) deductions of the Malthus theory, who formulate the now popular adverse relationship between population growth and economic development. In accordance with Ricardo's view, population growth put upward pressures on food prices, which eventually leads to higher real wages and greater economic rent to landlords. In the industrial sector, higher demand for food and higher real wages restrain sales, increase costs, lower profits, and consequently reduce the rate of capital accumulation required for economic development.

Malthus theory received strong criticism from neoclassical philosophers and economists, the most prominent of whom being Henry George (1996). In his book "The Population Debate", he argues that poverty, unemployment, and illness among the poor, which characterized the British society at the time Malthus introduced his theory, may not be attributed to population growth, but to the inequality of income and wealth distribution, as well as to the greed and exploitation practices of landlords against their workers. George also believes that population growth should be thought of as an addition to the society's production capacity and potential well-being, and not just as an addition to its demand for food. Contemporary economists like Schults (1981) are also criticizing Malthus' theory. In his book, he argues that diminishing returns to land, the major theoretical base of Malthus' theory, has lost its importance as a result of technical progress which introduced new substitutes for land (machineries, fertilizers, pesticides, and high yield varieties, etc.), allowing for higher productivity of labor and better standards of living for workers, despite the unprecedented growth of world population. Therefore, as a general conclusion, one may say that the weakness of Malthus' Population Theory lies in its reliance on a short analytical horizon, during which technical progress tended to be stagnant, while population growth naturally takes place gradually over a relatively longer period. Moreover, a new trend among contemporary economists strongly emphasizes theoretically, the possible existence of a positive relationship between population growth and economic development. McNicoll (1984)[5], among others, went further by statistically testing the nature of this relationship.

(Chaney, E. & Hornbeck, R. 2016) investigated economic dynamics in the Malthusian era using the 1609 expulsion of Moriscos from Spain. Sharp population declines in former-Morisco districts were accompanied by decreased output and increased per capita output. While these short-run results are consistent with standard Malthusian predictions, Malthusian convergence was delayed up to 1786 in former-Morisco districts. Archival sources and historical accounts suggest extractive institutions and cultural differences may have contributed to delayed convergence in population and output per capita. This historic episode provides an unusually rich setting to examine Malthusian dynamics, highlighting the potential for sustained differences in per capita output in the Malthusian era.

(Chen, S. & Kung, J.K. 2016) examined the question of whether China was trapped within a Malthusian regime at a time when Western Europe had all but emerged from it. By applying a difference-in-differences analysis to maize adoption in China from 1600 to 1910, it was found that cultivation of this New World crop failed to raise per capita income. While maize accounted for a nearly 19 % increase in the Chinese population during 1776-1910, its effect on urbanization and real wages was not pronounced. Our results are robust to different sample selection procedures, to the control of variables pertinent to Malthusian "positive checks," to different measures of economic growth and to data modifications. Our study thus provides rich empirical support to the claim that under the conditions in eighteenth- and nineteenth-century China, new agricultural technologies led to the Malthusian outcome of population growth without wage increases and urbanization. According to (Ehrlich, I. & Kim, J. 2005), the 19th century economist Thomas Robert Malthus hypothesized that the long-run supply of labor is completely elastic at a fixed wage-income level because population growth tends to outstrip real output growth. Dynamic equilibrium with constant income and population is achieved through equilibrating adjustments in "positive checks" (mortality, starvation) and "preventive checks" (marriage, fertility). Developing economies since the Industrial Revolution, and more recently Asian economies, have experienced steady income growth accompanied by sharply falling fertility and mortality rates.

They developed a dynamic model of endogenous fertility, longevity, and human capital formation within a Malthusian framework that allows for diminishing returns to labor but also for the role of human capital as an engine of growth. Our model accounts for economic stagnation with high fertility and mortality and constant population and income, as predicted by Malthus, but also for takeoffs to a growth regime and a demographic transition toward low fertility and mortality rates, and a persistent growth in per-capita income.

In Islam, problems of population growth are not supposed to exist. Allah, the creator, has guaranteed sustenance and forbade any means of preventing reproduction on plea of need as He says in The Quran:

"*Kill not your children for fear of want: We*
shall provide, sustenance for them as well
as for you verily the killing of them is a great sin" (Al-Israa, verse 31)

So, from an Islamic point of view family planning at the aggregate level should not be adopted as a mean of maintaining family standard of living.

At the macro level, Ramadan (1976) argues that Government policies and programs of birth control are forbidden in Islam. However, at the micro level, the main stream of Muslim scholars like Shallan (1983), advocate family planning in certain cases based on the individualistic conditions of a single family. Controlling number and time spacing of births are lawful whenever pregnancy endangers mother or child's health, or lead to some family related problems. Allah the Al-Mighty has given the right to individual families to decide on this matter according to their own reasoning, for which they are held accountable in the Day of Judgment.

The core issue of population growth and economic development has not received due concern by Muslim intellectuals. Therefore, the objective of this paper is to develop an Islamic theoretical framework for the relationship between population growth and economic development. In this regard, a new version of the Neoclassical production function will be developed which conforms with the Islamic framework of the relationship between inputs and the expected output in the presence of technological improvement supported by the blessing of Allah as a reward for good believers who show perfect faith and fear of Allah Almighty.

3. Mathematical Elaboration

As a starting point, let us first derive the economic growth rate from the following implicit functional form:

$$Y = f(k , L) \qquad (3\text{-}1)$$

$$\frac{dY}{dt} = \frac{dY}{dK} * \frac{dK}{dt} + \frac{dY}{dL} * \frac{dL}{dt} \qquad (3\text{-}2)$$

$$\frac{\overset{\circ}{Y}}{Y} = \frac{dY}{dK} * \frac{\overset{\circ}{K}}{Y} + \frac{dY}{dL} * \frac{\overset{\circ}{L}}{Y} \qquad (3\text{-}3)$$

$$\frac{\overset{\circ}{Y}}{Y} = \frac{dY}{dK} * \frac{\overset{\circ}{K}}{Y} * \frac{K}{K} + \frac{dY}{dL} * \frac{\overset{\circ}{L}}{Y} * \frac{L}{L} \qquad (3\text{-}4)$$

$$\frac{\overset{\circ}{Y}}{Y} = \frac{dY}{dK} * \frac{K}{Y} * \frac{\overset{\circ}{K}}{K} + \frac{dY}{dL} * \frac{L}{Y} * \frac{\overset{\circ}{L}}{Y}$$

$$rY = rK * eK + rL * eL \qquad (3\text{-}5)$$

Where: rY, rK, and rL are the growth rate of output, capital and labor respectively. While, eK and eL are the elasticities of production with respect to capital and labor respectively. Equation (3-5) expresses the growth rate of output as a weighted sum of the rate of growth of inputs (K and L), weights being the partial elasticities of output with respect to each of the inputs. Extending the above mathematical treatment on an explicit and more practical formula, Cobb-Douglas production function was chosen. Paul Douglas developed the first formulation of the Cobb–Douglas production function in 1927; for the purpose of pursuing a mathematical functional form that relates the changes in the inputs of both labor and capital to the change in output for a given level of technology. Paul Douglas Jointly with his colleague the mathematician Charles Cobb formulated a function of the

form $Y = AL^{\alpha}K^{\beta}$, where Y is the dependent variable measuring the quantity of output, while A, L and K are the independent variables.

Where, L and K are the labor and capital quantities respectively while A, represent the shifter of the production function that depends on the level of technology in use. α and β are both positive parameters representing the partial elasticities of output (Y) with respect to changes in each of L and K, holding other independent variables constant. The total value of α and β measures the total elasticity of output (Y) with respect to changes in both L and K by a given proportion (changing the scale of production) in the long run. Moreover, (α+β) also shows the returns to scale, if greater than one the function shows increasing returns to scale, less than one shows a decreasing return to scale, if just equal one shows a constant return to scale.

In the following simplest constant return to scale Cobb-Douglas production function:

$$Y = K^{z} * L^{(1-z)} \quad (3\text{-}6)$$

The growth rate of output may then be written as:

$$rY = zrK + (1 - z)rL \quad (3\text{-}7)$$

Following (Ispister: 1995) deductions, in the long-run, when the economy grows along a steady state equilibrium path, rK approaches rY then (3-7) may be rewritten as:

$$rY = zrY + (1 - z)rL \quad (3\text{-}8)$$

or $(1 - z)rY = (1 - z)rL$ Then $rY = rL$ (3-9)

If the population grows at a faster growth rate, per capita income is likely to fall in the short-run. In the long run, however, output eventually would be growing at the same rate as population and per capita income would restore its original level. Therefore, we conclude that, from secular perspective, and in absence of technological improvement, while population growth may have some negative impact on economic development in the short-run, no such relation holds in the long-run. Development measured by the growth of per capita real income will only be achieved through technological improvements.

4. An Islamic Cobb-Douglas function:

Like many other socio-economic problems, the population issue has been approached and treated in most of the Muslim countries in just the same ways adopted in non-Muslim countries. Population strategies are most likely based on the erroneous inherited dogma that slower population growth is a prerequisite for sustained economic development. The problem here is the weak Iman (faith) that preoccupies Muslims' hearts and minds in most Muslim societies today. They strongly believe in the Malthusian claim that population growth would inevitably lead to disastrous famines due to shortage of food, while as Muslims they are supposed to have a steady faith and belief in the words of Allah as revealed in Quran where He the Al-mighty says:

"*There is no moving creature on earth but its sustenance dependeth on Allah: He knoweth its resting place and its temporary deposit: All is in a clear Record*" (Hud, verse 6)

It is a pledge from Allah to grant sustenance for all mankind. A plausible pledge that is, for Allah has inexhaustible stocks of everything, allocated according to some rules stipulated by Him: as Allah says in Surat Al-Higr:

"*And there is not a thing but its (sources and) treasures (Inexhaustible) are with Us; but We only send down thereof in due andascertainable measures*" (Al-Hijr, verse 21)

Man was permitted to make use of all the natural laws created and bestowed upon him by Allah so that he may exert efforts in his work and reap their fruits by Allah's will. Then even though, Allah guarantees sustenance, it is attainable through a tremendously complicated set of causalities that require man to exert the due efforts. Moreover, the foreseen scarcity of resources, alarming consequences of population growth, and similar allegations are only sensible within the currently available set of information and knowledge related to resource and technology. The short-run rigidity of these constraints, however, has proved to be more flexible in the long-run when enough time is allowed for new resources to be discovered and better technology to be adopted within the prevalent set of natural rules. In an Islamic perspective, one believes in a totally flexible constraint. Allah the Al Mighty, creator of the afore-mentioned natural rules is always willing to relax such rules and constraints for those who show true belief and fear of Him the Al Mighty, as He promises them in Quran saying:

"*If the people of the towns had but believed and feared Allah, We should indeed have opened out to them (all Kinds of) blessings from heaven and earth but they rejected (the truth), and We brought them to book for their misdeeds*"
(Al-A'raf, verse 96)

This is the spiritual dimension which was overlooked by non-Muslim scholars of production function theories. Therefore, an appropriate Islamic approach to this issue is perhaps to examine the scientific factors, which determine resource productivity. In the conventional economic theory, productivity is said to be improved whenever greater output is realized form the same amount of resources. For a given stock of factors of production, this type of productivity depends entirely on the level of technology, that is: $P = P(T)\ P_T > 0$ (4-1)

Where P represents productivity and T is the level of technology. Productivity here is positively related to the level of technology. The relationship is obviously a merely materialistic one, in which productivity relies totally on the success man may attain in utilizing available resources within the domain of natural laws controlling the existing system of biological, physiological, ecological and meteorological conditions. From an Islamic perspective, however, this materialistic formulation suffers the major drawback of not being able to reflect changes in the domain of natural laws according to the will of Allah, the creator. In fact, man is merely a particle in a magnificent mechanism that Allah has created and controlled every part in it. Man just provides the causes, but everything thereafter is accomplished within the mechanism in accordance to Allah's will. A man and his wife, a farmer and his land, and even the clouds in the sky, all can create nothing on their own, they just provide causes for some sophisticated and totally divinely controlled process to be accomplished. In this regard, Allah says in the Holy Quran:

"*Do ye then see? The (human seed) that ye emit" (v.58) "Is it ye who create it, or are we the Creators?"(v.59) "See ye the seed that ye sow in the ground?" (v.63) " Is it ye that cause it to grow, or are We the cause" (v.64) "Were it Our Will, We could make it broke orts and ye would be left in wonderment " (v.65) " (Saying), We are indeed left with debts (for nothing)" (v.66) " Indeed We are deprived" (v.67) " See ye the water which ye drink?" (v.68) "Do ye bring it down (In rain) from the cloud, or do We?" (v.69) "Were it our Will, We could make it saltish (and unpalatable) then why do ye not give hanks?*" (Al-waaqia, v. 70).

Concerning the above-mentioned discussion, Muslims ought to redefine productivity in a way that maintains consistency between science and their Holy Islamic beliefs. Thus, productivity may be redefined as a function of technical progress and whatever blessings Allah may bestow on the actions of his believers. In mathematical form then: $IP = IP\ (T,B)\ P_T > 0\ P_{TT} < 0$ and $P_B > 0\ P_{BB} > 0$ (4-2)

Where; IP is productivity defined, T is technical progress, as a function of investment in research and development of new innovations. B is blessings Allah may bestow on his good believers. The relationship between resource productivity and each of T and B is positive. However, the second derivative is negative with respect to technological improvement (T), as a result of diminishing return to investment in research and development, and the limited horizon of human knowledge. On the other hand, the second derivative is positive with respect to unlimited impacts of Blessings and the endless horizon of knowledge of Allah the mighty. In other words, an Islamic society which attains all possible technical means and which has a strong faith and fears Allah in all aspects of life, may receive blessings from Allah that raise resource productivity to infinite levels, impossible to attain merely through technical improvements.

The effect of blessing may be measured mathematically by the difference between productivity changes in Muslim and non-Muslim societies. By taking the total derivative of equation (4-1) of resource productivity in a non-Muslim society we get: $dP = \frac{\partial P}{\partial T} * dT$ (4-3)

and by totally differentiating equation (4-2) of resource productivity in a Muslim society we get:

$$dIP = \frac{\partial IP}{\partial T} * dT + \frac{\partial IP}{\partial B} * \frac{\partial B}{\partial F} dF \qquad (4\text{-}4)$$

For two societies of the same level of technology, resource productivity may be greater in the Muslim society by a positive amount equal to the difference between (4-4) & (4-3), the second positive term in (4-4) that reflects the change in productivity due to blessings from Allah. In light of the above discussion, the previously mentioned Cobb-Douglas production function may now be rewritten in a revised form that reflects the Islamic dimension as:

$$Y = e^{(T+B)t} * K^{z} * L^{(1-z)} \qquad (4\text{-}5)$$

Where $e^{(T+B)t}$, the new term in the function, is nothing but the familiar shifter of the Neoclassical Model revised in such a way so as to react not only to technical progress (T) but also to blessings from Allah. In logarithmic form (4-5) may be written as: dln Y = (T + B) + z dln K + (1 - z) dln L
(4-6)

or rY = (T + B) + zrK + (1 - z)rL (4-7)

In the long-run when the economy grows along a steady state growth path, the growth rate of output approaches the growth rate of capital and (4-6) may be written as: rY(1-z) = (1-z)rL + (T+B)

$$rY = rL + \frac{(T+B)}{(1-z)} \qquad (4\text{-}8)$$

Therefore, in a non-Muslim society where B = 0, i.e., receiving no blessing at all, in such a case, per capita income can only be improved through a sustained technical progress over time. In the absence of any technical progress, population growth will lead to an equal growth in output with no improvement in per capita income, as indicated above. By contrast, in a Muslim society economic development expressed as an improvement in per capita real income, besides being an outcome of man's efforts in attaining technical progress, is primarily associated with and conditioned upon the blessing Allah the Al Mighty may bestows upon his believers.

In such blessed societies, population growth would then stimulate growth of output at an even faster rate, the difference being equal to (T + B)/ (1 - z) which is a positive amount, even if no technical improvement is attained.

So far, the idea as presented is quite simple and acceptable, however, it is essential at this stage to develop some theoretical relationship between population and other newly introduced variables in the model. As a starting point, blessings are related positively to both faith and fear of Allah and the population size, or:

$B = B(F,N)\ B_F > 0\ ,\ B_N > 0$ (4-9)

Where B is the amount of blessings, F is faith and fear of Allah and N is the size of population. The first derivative of B with respect to F is expected to be positive in accordance with the above-mentioned verse 96 of Al-Aaraf sura. B is also expected to be positively related to N, i.e., blessings are bestowed in proportion to the size of the population, since rewards good believers males and females individuals as Allah says:

> "*Whoever works righteousness, man, or woman, and has Faith, verily to him will we give a life That is good and pure, and We will bestow on such their reward according to the best of their actions*" (An-Nahl, verse 97)

One may deduce from this verse, Allah's blessings as rewards for good deeds are conferred on people each according to his own deeds, implying that under certain levels of faith, the larger the size of the society the greater are the reward received in terms of blessings. Given this Islamic theoretical setting, we may turn now to its practical implications. Using the Neoclassical Growth Model with the Cobb-Douglas production in its revised form (equation 4-5), and by taking the derivative of rY in equation (4-8) with respect to rL (the same as rN the population growth rate in the long run) we get: $\frac{\partial rY}{\partial rL} = 1 + \frac{(T+B)}{(1-z)} * \frac{\partial B}{\partial rL}$ (4-10)

Since (T + B) > 0, z < 1, and $\frac{\partial B}{\partial rL} > 0$

Then the left-hand side of (4-10) is greater than one, which means that an increase in the growth rate of population would lead to a greater increase in the growth rate of output, i.e., rY will always be ahead of rL.

In other words, Allah has guaranteed societies of good believers an ever-growing per capita real income, and a sustained economic development regardless of its rate of population growth.

Conclusion

Adopting a revised form of the Cobb-Douglas production function, incorporated into the Neoclassical Growth Model, the aim of this paper has been to verify the relationship between population growth and economic development from an Islamic perspective. The Islamic framework developed in the presence of technological improvement supported by the blessing of Allah as a reward for good believers who show perfect faith and fear of Allah Almighty, guarantees a sustained positive relationship between population growth and economic development. Islam is not calling Muslim nations to take a passive attitude toward technological improvements; in fact , Islam urges Muslim societies to strive at making an efficient use of their endowed resources by acquiring the most developed science and technology base. Meanwhile, Muslim societies are urged to maintain their eligibility for Allah's blessings through a steady faith and fear of Allah as a prerequisite for success.

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