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EFFECT OF POPULATION DENSITY ON THE LEVEL OF DEVELOPMENT

Mohammad Abbas Hakeem

Abstract

The world population has crossed the 7 billion mark and simultaneously much has been researched and said on the subject from the economic perspective videlicet linking population growth to economic growth. With booming population, however, one issue remains not adequately addressed which is the concentration of this population at certain geographic points - urban centres, cities. Therefore, I have chosen to analyse in this paper the effect of population density on development. With established economic models such as Solow's, we know that population growth drives economic growth. But, is the same true about increasing density of population? We would, here, discuss the notion that increased density would strain the resources, make infrastructure more susceptible to rivalry, and increase costs of provision of public goods.

Keywords: Population density, cities, economic development, technology, public goods, environment

Introduction

Consider a firm which hires labour to produce a certain product as its output. We go on hiring one more labour till a point the addition to output made by the newly hired labour will be increasing but according to diminishing marginal returns this won't be the case every time. The addition to output will pace down, or the marginal output will start to decrease and subsequently become negative. It is a commonly encountered problem in farmlands where family members are disguisedly unemployed.

This was a micro view of an unanimously accepted theory: overcrowding leads to efficiency losses. The capital is unable to extract the threshold potential from each worker. Alternatively, when too many people are assigned to work on a specific capital, the capital cannot provide enough for each person to work on. But this was a production perspective and parallelly an analogy can be drawn from the consumption perspective. When too many people barge in on a set of resources, the average portion each person will receive might become insufficient. The resource will become overexploited and won't be able to satisfy consumption needs effectively. So coming to the macro side we should

see, *prima facie*, that with too much of population congestion the pressure on the resources will pass them off as scarce and consequently it will hamper overall development and won't contribute towards better living standards of the people.

Counterintuitively, Olsun (1996) observes that there is a positive and statistically significant relationship between population density and per capita income. Therefore population density must have opposing forces - one towards improving and the other towards impoverishing the economy. We will here analyse the effects population density has on the level of development of the economy.

Negative Effects

Malthus (1798) has strongly advocated that population increases at a geometric pace whereas food production increases only at an arithmetic pace. When population growth outpaces technological growth there will be instances of hunger, disease and survival. This view is in line with the general notion of higher population density that was discussed earlier.

The denser the population in a geographic unit, greater will be the effects on environment quality. Most importantly, the green-belt of an area is inversely related to the density of population of that area. Almost all other environmental effects of population density are repercussions of this effect. For one, the dwelling spaces become shorter and buildings become taller, and green-belt shrinks. The quality of air will be deteriorating as we climb up the ladder of population density. For instance, a research led by Lok Lamsal at NASA concluded that greater the population in an urban setting, higher will be the contribution to air pollution. Consequently, big cities like New York, New Delhi, London and Beijing have poor air quality and cities like Hong Kong, London and New Delhi have witnessed heavy smog conditions. Besides, the green belt provides a cooling effect and the lack thereof results in temperature increase. All these things, clearly, will effect the general wellbeing of the populace.

Positive Effects

Most importantly, greater number of persons explicitly means more labour force. With more labour force, more production activities can be undertaken which individually contribute to the domestic product and push it upwards.

The denser the population, easier will it be to disseminate technology and technological benefits. It also makes sense to do so in a more densely populated area since greater population values from such dissemination of information. Also, higher density is linked to greater innovation and variety of technical skills. Klase and Nestmann (2006) point out that Kremer's model suggests that there exists a concave relationship between

population density and technological change. The more the number of persons, the greater will be the proportion of intellectuals who will carry out inventions and discoveries. Hence, density of population is directly proportional to innovation. Carlino, Chatterjee and Hunt (2007) find that patent intensity has a positive relationship with density of population. Besides, optimists (who believe greater population density is more beneficial) think that greater density creates more scarcity and creates a stronger drive in humans to develop technology and innovate. According to Boserup (1981), "Population growth creates pressure on resources. People are resourceful and are stimulated to innovate, especially in adversity". This is corroborated by findings of Kremer (1993) which suggest that regions with high population densities but no opportunities of technological contact from other regions achieved high levels of technological growth.

As far as overcrowding in agriculture goes, it may surely have associated short- and medium-run costs but according to a report "Population growth and economic development: Policy Questions" (1986) greater population density on agricultural land will favourably influence infrastructural investment in transportation, communication, irrigation, markets, etc

Producers and manufacturers also benefit from greater population density. For them it means bigger demand and hence, will result in a bigger market. Subsequently, it will lead to a multifarious assortment of goods and services available to the populace. Thus, it is healthy for the market since it leads to greater degree of competition and the struggle for bettering the technology. In contrast, a thinly populated place will result in a delimited market, which will generate profits for entrepreneurs that might be attenuated when juxtaposed with the previous case. But there are profits nonetheless and the entrepreneurs will not feel the need to expand their production. This, an impetus for growth is missing here.

The denser a place is populated, more will be the tax payers (Owusu 2012). Thus, clearly, the society benefits per se with more tax revenue accruing to the government which can be used to provide better facilities for the people. There will also be more savings and consequently these savings will be invested which accumulates as capital stock. Hence, industries prosper.

Public Goods

Non-rival and non-excludable goods are termed as public goods, provided by the government for common use of the people. The concept is that the use by one person should not render the good available to another person to diminish and price cannot be used as an instrument to exclude certain individuals from using the good. The question that arises here is what is the effect of population density on the provision of public

goods? Let us take a peculiar example of roadways, which upto a certain level is non-rival but when the saturation point of the carrying capacity is reached, the roads become rival and a marginal vehicle plying will reduce the effective use for all others plying on the same road at the same time. This is what greater density will entail. The more populated a town or city is, the more vehicles will be owned by the people and more will be the traffic plying on the roads. It is now common in most cities to experience traffic jams during peak hours of the day. Hence, the cost of providing public good will reduce at initial levels when population density increases and after a certain point, here the saturation point of the road, the cost of provision will increase since more vehicles demand more roads. This will give us a J-curve for population density and cost of provision of public good (Ladd 1992). Therefore, with increasing density of population the need for public infrastructure also increases. Likewise, a public bad poses a concern as well. Associated with more people is more garbage and the need for greater and more efficient garbage disposal systems. Here the J-curve mentioned earlier can be extrapolated - initially, the cost for providing garbage disposal services decreases with increasing density of population and after a point it will start increasing.

Conclusion

Countries like Pakistan, Nigeria and Vietnam are among the most densely populated countries but with lower economic development. Facts and studies mentioned in this paper are not to advocate that higher population density alone will necessarily mean greater economic success; there are other factors that aid a thick density to conquer opportunities and achieve greater levels of economic development, technology being the leading factor.

Rapid population growth is different from high population density. The latter might be beneficial in terms of greater labour force but the former raises concerns about age distribution (Owusu 2012). It means that the dependency ratio of the population is increasing and will slow down per capita productivity at least in the short run. If population growth outpaces technological growth it will lead to reduction in GDP. Rapid population growth imposes short-run costs on the economy, but if the population increases at a slower pace, the economy finds it easier to accommodate addition to population and will also not create problems associated with age distribution. Population growth and economic development: Policy Questions (1986) concludes that "for most developing countries, slower population growth is unlikely to result in a net reduction in agricultural productivity and might well raise it".

Governments have a crucial role to play in the development process. Places with higher population density have an edge over others provided the government proves to be

responsible towards development. The government should, first of all, take steps to nurture the human capital in terms of health, education and skills. Only the healthy labour can be productive, and education and skills enhance the quality of human capital. The government should also make the economic atmosphere conducive to savings and investment and should not hinder foreign investments.

There is also a need to revise technology keeping in mind environmental concerns. More and more technology should be focused on being environmental friendly. This will reduce the adverse effects of greater population on the environment. Corporations also have a responsibility towards environment and should revise their operations in order to comply with environmental-friendly standards.

One more reason for enhanced productivity of already high performing urban centres is that such centres are a point of attraction for skill. Consequently, people from other regions tend to migrate to these places which further increases their local population. According to Malthus (1798) when output/production (subsistence) grows, population also increases.

References

Olson, Mancur (1996): "Distinguished Lecture on Economics in Government: Big Bills Left on the Sidewalk: Why Some Nations are Rich, and Others Poor", *Journal Of Economic Perspectives*, Vol 10, No 2, Pp. 3-24.

Hansen, Kathryn (2013): "NASA Scientists Relate Urban Population To Air Pollution", NASA. <https://www.nasa.gov/content/goddard/nasa-scientists-relate-urban-population-to-air-pollution/>.

"Population growth and economic development: Policy Questions" (1986), 5th ed. Washington: National Academy Press, pp. 47-52.

Owusu, Richard Kofi (2012): "Population density and Economic Growth Demography as a tool for growth", Masters. Roskilde University.

Boserup, Ester (1981): "Population and technological change: a study of long-term trends", Chicago: University Of Chicago Press.

Kremer, Michael (1993): "Population Growth and Technological Change: One Million B.C. to 1990", *The Quarterly Journal of Economics* (The MIT Press), Vol. 108, No. 3, Pp. 681-716.

Malthus, Thomas Robert (1798): "An Essay on the Principle of Population", *Library of Economics and Liberty*, Ed. 6, Chapter II

Klasen, Stephan and Nestmann, Thorsten: (2006): "Population, population density and technological change", *Journal of Population Economics*, vol. 19, no. 3, Pp. 611-626.

Evenson, Robert Eugene (1984): "Population Growth, Infrastructural Development, Technology and Welfare in Rural North India", Paper prepared for the IUSSP Seminar on Population and Rural Development, New Delhi.

Carlino, Gerald A., Satyajit Chatterjee, and Robert M. Hunt (2007): "Urban Density and the Rate of Invention," *Journal of Urban Economics*, Vol. 61, No. 3, Pp. 389-419.

Ladd, Helen F. (1992): "Population Growth, Density and the Costs of Providing Public Services", *Urban Studies*, Vol. 29, No. 2, Pp. 273-295.