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The Impact of Health on Economic Growth in Nigeria

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Abstract
This paper examines the impacts of health on Economic growth in Nigeria. The Cointegration, and Granger Causality techniques were used in analysing Quarterly time series data of Nigeria for the period of 1995-2009. The study finds that GDP is positively influenced by health indicators in the long run and health indicators cause the per capita GDP. It reveals that health indicators have a long run impact on economic growth. Thus, the impact of health is a long run phenomenon .The major policy implication of the study is that, a high level of economic growth can be achieved by improving the health status of the populace, especially if the current status is at low ebb.
Keywords: Health human capital; Economic growth; Cointegration; Granger Causality.

Introduction

The relationship between human capital and economic growth has received generous enquiries in the literature .The significance of Human capital in achieving sustainable economic Growth has been documented. Growth theories suggest the role of human capital in achieving significant growth in the economy. The economic view of human capital encompasses education, health, training, migration, and other investments that enhance an individual's productivity. Outcome from several studies seem to suggest that there is a positive correlation between health status and sustainable economic growth. The wide acceptance of this nexus prompted the prominence of health outcome in the Millennium Development Goals (MDGs). In fact three of the goals are health specific while the others can also be regarded as health enhancing. Thus, the development of human capital becomes more important in many resource constraint countries like Nigeria. The opportunity costs of spending on health is very high and thus the need for a justification on the increase or otherwise of health spending in Nigeria. Incidentally, Nigeria is among the developing nations with poor health outcomes and its attendant problems. The health status of Nigeria is still considerably low and exists below that of some countries in West Africa. Low life expectancy at birth, high infant and maternal mortality rates, malaria and tuberculosis afflictions are some of the characteristics features of the Nigeria`s health status. Life expectancy at birth in Nigeria was estimated at only 48 in 2007, compared with 56 in Ghana. This is complemented by the high numbers of women who die of complications during pregnancy or childbirth. Although the global maternal mortality ratio of below 400 maternal deaths per 100 000 live births in 2008, the maternal mortality ratio for Nigeria was 1100 per 100 000 live births, still on the high when compared to 560 and 910 in Ghana and Guinea respectively. The prevalence of HIV/AIDS among adults aged 15 and above infection has contributed significantly to Nigeria's low life expectancy (WHO 2010). It was estimated at 2,886 per 100,000 people. It is above the Prevalence rate in Ghana (1722), but below that of Cameroun (4580). Also, the per capital income in Nigeria is low, with more than half of the population leaving below the poverty line. Thus, provision of adequate funding for health care either by the household or the government remains difficult.

Most of the literatures that have incorporated human capital in the growth studies, tends to Paid greater attention on analysing the impact of education on economic growth, while ignoring the role of health human capital. It is only in very recent times that studies have started looking at health and tried to estimate the relationship between health status and economic growth. There exists a two-way relationship between improved health and economic growth. Health and other forms of human and physical capital increases the per capita GDP by increasing productivity of existing resources coupled with resource accumulation and technical change. Furthermore, some part of this increased income is spent on investment in human capital, which results in further per capita growth. On the other hand, Economic development results in improved nutrition, better sanitation, innovations in medical technologies; all this increases the life expectancy, reduces the infant mortality rate. Akram (2008). Therefore, this paper seeks to investigate and established the relationship that exists between health and per capita GDP in the long-run. This study will further test whether, there exists a two-way causality between health and per capita GDP or causality is unidirectional given conflicting results in the literatures.

2. Nigeria Health Care Sector

Health services are provided by the private and public sectors. From private sector, there are non-governmental organization, private for-profit providers, community-based organization and religious and traditional care givers. Government assumes the responsibility of health service provision in public sector. The provision of health services in public sectors are at three levels namely the Primary, Secondary and Tertiary. At the primary

level, services are at the door step of communities where preventive, curative; primitive and pre-referral cares are provided. Medical personnel that provide such services are nurses, community health officers, community health extension workers (CHEWs) and environmental health officers. The available facilities at this level include health centres, dispensaries, and health.

At secondary level, there are general hospitals to provide medical, laboratory and specialized health services, namely, surgery, obstetrics, paediatrics, genecology and so on. Major health workers that are at the secondary level are doctors, nurses, midwives, laboratory scientists and pharmacists. The typical facility use is general hospitals. Tertiary level of health service provision is the highest health care in the country. The facilities include specialist and teaching hospitals, and federal medical centres. They are equipped with high technology for special health services and serve as resource centres for knowledge generation.

The health status in Nigeria is ranked low among other developing country in the same category. Life expectancy is put at 52 years in 2011(according to World Bank) and crude death rate, in that same year as 14%. It is estimated that 124 out of 1000 new births do not survive beyond age 5. Only 39.56% of male and 42.25% of female survive up to the age of 65 years. There are close to 3 million adults (ages 15-49) living with HIV. While the estimated HIV/AIDS prevalence rate is 3.7. Nigeria has large stock of health workers that is comparable to that of Egypt and South Africa. However, births attended by skilled health personnel are estimated at 39 percent of total birth.

The expenditure pattern shows that only few amounts are spent on health in Nigeria. In 1997, 4.6% of gross domestic product (GDP) is accounted to have been spent on health care. The figure rose to 6.6% in 2005 and latter fell to 5.8 in 2009. The actual total expenditure for 1997, 2001, 2005 and 2009 stood at 134,522, 256,283, 972,921 and 1,596,573 (in million naira), respectively. The figure is an indication of poor commitment of the nation to improved health provisions and deliveries. In the total expenditure on health (THE), the available data shows that out of pocket expenditure constitutes higher proportion. Public expenditure on health (PHE) was 36.7% of the total health expenditure in 2011. While out of pocket expenditure accounts for 60.4% of the total expenditure.

3. Literature Review

The relationship between health and economic growth has received attention in the literature. Adeniyi and Abiodun (2011) analysed the effects of health expenditure on the Nigerian economic growth, using data on life expectancy at birth, fertility rate, capital and recurrent expenditures between 1985 and 2009 argues that if funds is judiciously expended in the health sector, the effects of this expenditure on the economic growth will be direct and substantial. Thus the need to improve the quality and type of health provided. Odior (2011) using an integrated sequential dynamic computable general equilibrium (CGE) model, examined the potential impact of increase in government expenditure on health in Nigeria. His result shows that the re-allocation of government expenditure to health sector is significant in explaining economic growth in Nigeria. Thus, the need for government to investment in health services.

Riman and Akpan (2010) investigate the causal direction and long run relationship between government health expenditure, poverty and health status, in Nigeria . They employed the Granger causality test and Vector Error Correction Model (VECM) in establishing a strong causal bi-directional relationship running between life expectancy and poverty in Nigeria. Their study also reports the existence of a long-run relationship between poverty and health status. However, they found a non- significant longrun relationship between health status and government health expenditure. They concludes that policies that would improve health status should be such as would promote adult literacy level, reduce the poverty and income disparity since, increasing budgetary allocation to funding health sector alone without reducing poverty level, would not be sufficient to improve the health status of the country.

Bello (2005) determnes the relationship betwween deaths from malaria and public health and non health expenditure in Nigeria, the impact of malaria deaths on the economy and how much more public expenditure is required to reduce deaths from malaria. Using the Filmer and Pritchet, and the gross output tranfer models. His study reveal ed that there is a negative relationship between deaths from malaria , public health expenditure, per capital income and non-public health expenditure, but a positive relationship deaths from malaria and political instability. His study further found that an average of 5.86% of the GDP was lost malaria deaths anually, between 1975 and 2001. Therefore, there is a need to increase public spending of the health sector. Odubunmi et al (2012) examined the relationship between health care expenditure and economic growth in Nigeria for the period 1970-2009. They employed the multivariate cointegration technique proposed by Johansen and found the existence of at least one cointegrating vector describing a long run relationship among economic growth, foreign aids, health expenditure, total saving and population. The cointegrating equation however shows some deviations in terms of the signs of the coefficients of foreign aids and health expenditure which they attributed to some diversification of foreign aids to other uses or inadequate allocation to health services .

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Yaqub et al (2013) while investigating the impact of public health spending on infant and under-5 mortalities as well as life expectancy. Using the two-stage-least squares in addition to the ordinary least squares techniques, because of the possibility of reverse causality, revealed that public health expenditure has negative effect on infant mortality and under-5 mortalities when the governance indicators are included, with a reversed signs without the governance indicators. They argued that as the level of corruption goes down and value of the corruption perception index rises, there is an improvement in health status since infant and under-5 mortalities decline and life expectancy rises. Thus, simply increasing public expenditure on health is less likely to lead to improvement in health status unless corruption issue is addressed. Also, Mehrara and Musai (2011), examine the causal relationship between the health expenditure and the GDP in a panel of 11 sampled oil exporting countries by using panel unit root tests and panel cointegration analysis. They used a three variable model with oil revenues as the third variable. Their results show a strong causality from oil revenues and economic growth to health expenditure in the oil exporting countries. While health spending does not have any significant effects on GDP in short- and long-run. Their findings show high vulnerability of oil dependent countries to oil revenues volatility. Therefore to insulate the economy from oil revenue volatility will requires an institutional mechanism de-linking health expenditures decisions from current revenue.

Mayer (2004) in his study on the intergenerational impact of health on economic growth argues that human development is an intergenerational process in which early child development plays a crucial role, and which can be characterized by poverty trap. He claims that preventing the formation of human capital, will hampers economic growth in the long-run, and reduce the scope of growth policies in other sectors of the economy. He identified factors such as early child nutrition and health as having indirect effects on adult income through education which explain a large portion of the long-term impact of nutrition and health on economic growth. He concluded that, an integral public policy for long-term growth and development aiming at dismantling poverty traps so as to eradicate poverty and inequality must sufficiently emphasize the formation of the coming generations, beginning with early child development. In particular, it must eradicate child malnutrition, including micronutrient deficiency and obesity.

Wilhelmson and Gerdtham (2006) in their review of the impact of of investing in maternal–newborn health (MNH) on economic growth suggest the use of more comprehensive MNH measures that consider the health of both mothers and newborns and aspects of ill-health other than death, such as measures of quality of life, functional limitations, mental health and sickness absenteeism. Mizushima (2008) examine the effect of aging population and public health funding(PHF) on saving and the growth rate of the economy using a simple growth model show that an increase in life expectancy increases the growth rate in the economy without PHF,but has an inverted U-shaped in the economy with PHF.

Edwards (2005) in his study on postwar mortality decline and economic growth in industrialised demonstrated how growth in per capita income has not synchronized with increases in life expectancy among industrialized nations since 1960, even though there is evidence of convergence among rich countries in each variable separately, contrary to what theory suggests that income and health should be interrelated. Individuals in some advanced nations are increasingly living longer than those in others, even though their incomes are growing similarly. That is, the joint distributions of income and life expectancy are not converging, although the marginal distributions are.

Lucian et al (2010) further research into the already established relationship between economic growth and health by using the results of some previous works and applying them on the recent data, in order to find out if the economic growth rate in the current European Union member countries is connected to the growth rates of various diseases. Based on the existing economic theories, they examine if the results found in literatures apply when regressing different types of variables in the EU member states for the period of 1995-2007. Their results show a positive relationship between the health of population and the GDP, with the causality in the relation between the real GDP and the economic growth directed from the economic growth to the diseases growth rates. In the same vein, Conceicao and Kim (2009) found that, the impact of economic fluctuations on growth is that the growth acceleration episodes are associated with improvement in human development, and the growth deceleration episodes are associated with deterioration in human development. But there is heterogeneity across the income level of countries, and asymmetry between the acceleration and deceleration.

Rivera and Currais (2003) analyze the effect of health investment on productivity as an important variable associated with human capital accumulation. The authors reported a positive relationship between health

expenditure and income growth. Furthermore, while looking at the bounded gains of health status, the authors divided the sample according to the median of total health expenditure and found that the countries with lower levels of health spending obtain larger benefits when other determinants of growth are held constant.

Bloom et al (2001) extend production function models of economic growth to account for two additional variables identified as fundamental components of human capital: work experience and health. Thir main finding show that good health has a positive, sizable, and statistically significant effect on aggregate output, with a little variation across countries in average work experience, thus differentials in work experience account for little variation in rates of economic growth. Their reports futher indicate that the effects of average schooling on national output are consistent with microeconomic estimates of the effects of individual schooling on earnings, suggesting that education creates no discernible externalities.

Bloom et al (2003) growth model accounts for economic growth by the growth of factor inputs, technological innovation, and technological diffusion. Their main result, which is consistent with their theoretical argument and with the microeconomic evidence, is that health has a positive and statistically significant effect on economic growth. Their result suggests a one-year improvement in a population's life expectancy contributes to an increase of 4% in output. This is a relatively large effect, indicating that increased expenditures on improving health might be justified purely on the grounds of their impact on labour productivity, quite apart from the direct effect of improved health on welfare. While this supports the case for investments in health as a form of human capital, they are not able to distinguish in their analysis between the effects of different types of health investments that affect different groups within the population. Grimard and Harling (2004) conducts panel data analysis covering 91 countries, using an augmented Solow growth model and notification data of tuberculosis incidence from 1981 to 2000, finds that countries with a lower burden of tuberculosis grew faster than those which were more heavily afflicted. They found a persistent effect of between 0.2 and 0.4 percent lower growth for every 10 percent higher incidence of tuberculosis, which corresponds to an annual loss of between US$ 1.4 and 2.8 billion in economic growth worldwide.

Akram et al (2011) while investigating the impacts of different health indicators on Economic growth in Pakistan, employs the Cointegration, Error Correction and Granger Causality techniques on the time series data of Pakistan for the period of 1972-2006. They find that Per capita GDP is positively influenced by health indicators in the long run and health indicators cause the per capita GDP. However, in the short run the health indicators fail to put significant impact on per capita GDP. This suggests that impact of health is only a long run phenomenon and in the short run there is no significant relationship between health variables and economic growth. It is not clear whether there exists a causal relationship between economic development and health care spending in Nigeria. Nigeria like most developing nations favours spending on other sectors of the economy at the detrimental of the health. The government always based is argument on the fact that once the economy is developed, the health sector will follow suit. Therefore, less emphasis on the provision of public expenditure.

4. Methodology and Data

4.1 Theoretical Framework

This study employs Schumpeterian theory of growth to model the influence of health on economic theory adopted from Howitt, 2005. Schumpeterian theory is an endogenous growth theory that attributed differences in growth rate between rich and poor countries to the rate of productivity growth and not rate of factors accumulation. The theory distinguished explicitly between physical and intellectual capital and also between saving, that causes growth in physical capital, and innovation, that causes growth in intellectual capital, which the first generation of endogenous growth theories lump together. It is based on the assumed creative destruction by arguing that new innovation leads to competitive edge by rendering obsolete previous innovation. It also considers the role of technology transfer- international diffusion of technology, a technology spill over a country enjoy from other country's innovation. This theory implied that a country that is at the lower rand of technology ladder can take advantage of the innovation that is been created already in other country. The theory differs from neoclassical theory by assuming that technological progress is endogenous. Unlike the neoclassical growth theory of Solow, the endogenous growth predicts growth rate determines by the global technological progress. The advantage of Schumpeterian theory over the neoclassical is that it attributed differences in growth rate between rich and poor countries to the rate of productivity growth and not rate of factors accumulation. Investment in research and development is significant to this end. Health is treated as a component of human capital and by this it contributes and predicts relative productivity and per capita GDP through productivity efficiency, skill accumulation, research efficiency and intensity, learning efficiency, school enrolment and savings.

4.2 Model Specification

The economic growth model used in this study, based on the theoretical framework discussed above can be specified thus

RGDP = f(GF,HE,LE,FR)

$$GDP_t = \alpha GF^{\beta}_t HE^{\delta}_t, LF^{\theta}_t FR^{\eta}_t$$

The reduced equation after taking the natural logs of both sides is specified below

$$LGDP_t = \alpha + \beta LGF_t + \delta LHE_t + \theta LLF_t + \eta LFR_t + \varepsilon_t$$

The variables (that formed the model) are expressed with respect to time, where;
GDP = real gross domestic product
GF = gross fixed capital formation
HE = health expenditure
LF = life expectance, at birth
FR= fertility rate
ε = error term
α = the intercept
$\beta, \delta, \theta, \eta$ are coefficients of the independent variables.

4.3 Granger Causality

The Granger (1969) enable us to see how much of the current GDP can be explained by past values of GDP and then to see whether adding lagged values of explanatory variable can improve the explanation. We states that GDP Granger cause x (explanatory variable) if x helps in the prediction of GDP. We shall run a bivariate regressions of the form

$$y_t = \sum_{i=1}^{k} \alpha_t x_{t-i} + \sum_{i=1}^{k} \beta_t y_{t-i} + \varepsilon_t$$

$$x_t = \sum_{i=1}^{k} \gamma_t x_{t-i} + \sum_{i=1}^{k} \rho_t y_{t-i} + \mu_t$$

Where μ_t and ε_t are two white noise series and k is maximum number of lags

4.4 Data Requirement and Sources

The growth model is estimated for Nigeria using annual series taken from the Word Bank Development Indicator (2013) database over the 1995-2009 periods. Since the objective of this study is to examine the effects of health on economic growth, we include two categories of health indicators- health input indicators and health output indicators. Health input indicators comprises of expenditure on health services, availability and quality of health facilities etc. While health output indicators includes life expectancy, infant mortality rate and adult survival rate, fertility rate etc. Based on the availability of time series data; life expectancy, and fertility rate are used as health output indicators. While health expenditure is used as the health input indicator. The dependent variable of the model is Per capita GDP at purchasing power parity. Life expectancy and infant mortality are measured in years. All the variables used in the analysis are expressed in natural logarithm.

5. Results and Findings

5.1 Results of ADF Test

The study employs the ADF (Augmented Dickey and Fuller methodology. The null of a unit root is investigated against the alternative of a stationary process for all the series.

Table 1 shows the results of the ADF unit root tests. The level models and difference models have been specified with constant and time trends in the data generating process. The table shows that more or less, a unit root is detected for the level variables, while the first differences appear to be stationary. Mixed results in relation to the order of integration are obtained. The inclusion of a time trend seems to affect the outcome. However, most of the series are found to be I(1). Overall, based on these observations, the series appear to follow an I(1) process.

Table 1. Results of ADF Test

Variable	Level			1st Difference		
	Intercept	Trend	None	Intercept	Trend	None
Per capita GDP	0.6082(-3.6010)	-0.1734(-4.1985)	1.731399(-2.6226)	-6.1531(-3.6055)	-6.3908(-4.2052)	-2.5564(-2.6256)
Life Expectancy	1.1959(-3.6329)	-4.9135(-4.2350)	3.1809(-2.6327)	-1.8389(-3.6210)	-0.7644(-4.2191)	-0.8723(-2.6290)
Health Expenditure	-1.9294(-3.6463)	-1.4057(-4.2627)	-2.1848(-2.6369)	0.7819(-3.6616)	-0.4816(-4.2849)	0.9569(-2.6417)
Fertility Rate	1.3340(-3.6210)	-2.5155(-4.2268)	-1.4037(-2.6290)	-1.4421(-3.6210)	-3.7629(-4.2191)	-0.5931(-2.6290)
Gross Capital Formation	-1.6876(-36056)	-0.3501(-4.1985)	-0.5454(-2.6240)	-3.6094(-3.6055)	-3.6115(-4.2050)	-3.5793(-2.6241)

Values in parenthesis are MacKinnon critical values for rejection of hypothesis of a unit root

5.2 Pairwise Granger Causality Test

Table 2 below presents the direction of causality between economic growth measured by the log of real GDP, life expectancy, health expenditure, gross capital formation and fertility rate. These results show that health output variables (life expectancy , fertility rate) and health input variable (health expenditure) granger cause per capita GDP and vice versa. Thus, we reject our null hypothesis. This is in line with Riman and Akpan (2010) who reported a bi-directional relationship between health expenditure, health status and poverty. However, the result indicates that there exists a unidirectional casual relationship between GDP and gross capital formation. Thus, we cannot reject the hypothesis that GDP does not granger cause GF but we do reject the hypothesis that GF does not Granger cause GDP. Therefore it appears that Granger causality runs one-way from GF to GDP and not the other way.

Table 2: Results of Granger Causality Test

Null Hypotheses	F-Statistics	Probability	Direction of Causality
GDP does not Granger cause FR FR does not Granger cause GDP	12.9210 6.1908	0.0001 0.0050	GDP ↔Fertility Rate
LEP does not Granger cause GDP GDP does not Granger cause LEP	13.7958 56.9592	0.0000 0.0000	Life expectancy↔GDP
GF does not Granger cause GDP GDP does not Granger cause GF	4.5784 1.5124	0.0171 0.2345	Gross Capital Formation →GDP
THE does not Granger cause GDP GDP does not Granger cause THE	5.9210 13.4143	0.0061 0.0004	Health expenditure↔GDP

5.3 Testing for Cointegration

The possibility of cointegration between the variables is explored along the lines suggested by Johansen(1991 1995a). We examined the cointegration relationship between the variables LTHE, LGDP, LGF, LLEP and LFR. Table 3 presents the cointegration test results between the variables by employing Johansen procedure. Both the trace test and the maximum eigen value test are performed. Regarding the five variables the trace test shows a value of 254.33 (critical value at 5% is 68.8), and the maximum eigen value test has a value of 99.24 (critical value at 5% is 33.87). These results show that the null hypothesis of no-cointegrating vector can be strongly rejected for the variables. The null hypothesis of no-cointegrating vector (HB: r =o) is rejected at 5% for all the variables, indicating that there is at least one cointegrating vector.

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob.***
None*	0.9164	254.328	69.81	0.0000
At most 1*	0.8504	155.079	47.86	0.0000
At most 2*	0.6386	79.089	29.80	0.0000
At most 3*	0.5502	38.382	15.50	0.0000
At most 4*	0.1484	6.425	3.84	0.0112

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3b: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistics	0.05 Critical Value	Prob.***
None*	0.9164	99.244	33.88	0.0000
At most 1*	0.8504	75.99	27.58	0.0000
At most 2*	0.6386	40.706	21.13	0.0000
At most 3*	0.5502	31.957	14.26	0.0000
At most 4*	0.1484	6.425	3.84	0.0112

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4: Normalised Cointegrating Coefficients

Variable	Coefficient	Std Error	t- Statistics
LOG GF	0.6772	0.0690	9.8129
LOG LEP	2.9871	0.4551	6.5631
LOG THE	0.0316	0.0121	2.6041
LOG FR	-3.6159	0.9277	-3.8975
R-Sguared 0.9347			

The normalized empirical result for the five variables (Table 4) shows that the estimated regression Models yields a consistent estimator of the parameters. Also, the model F statistic, is significant at the $\alpha = 0.01$ level, and reinforcing the *R*-squared of the specified model, means that a statistically significant portion (~=93 percent) of the variance in GDP is jointly explained by the model's independent variables. The health status variables' coefficient , are positively signed as theoretically expected and highly statistically significant. However, FR is negatively signed but significant in explaining GDP. Results reveals that in the long run indicators of human capital i.e. health and physical capital both have significant impact on economic growth.

6.0 Conclusions

This study has revealed that there is a cointegrating relationship among GDP, gross capital formation and other measures of health status. The results further show that per capita GDP Granger cause gross capital formation and measures of human capital and vise versa, implying that a bi-directional relationship exists. The role and importance of per capital gross domestic product in human capital development cannot be overemphasized as a mechanism for effective allocation of fund to the health sector and ensure sustainable health status. Thus, this study investigated the long-run economic relationship between health and gross domestic product in Nigeria. Using a time series data of five variables followed over 42 years, we have studied the stationarity and cointegration properties of health expenditure and GDP, life expectancy, fertility rate, and gross capita formation, ultimately measuring the long term impact of the identified exogenous variable on GDP. The Cointegration result confirms that health variable plays a very significant role in determining the long run economic growth. As all the health indicators have a significant impact on the long run economic growth. Our analysis indicates that GDP and most of its determinants are non-stationary, and that they are linked in the long-run.

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