Theoretical and Practical Research in Economic Fields

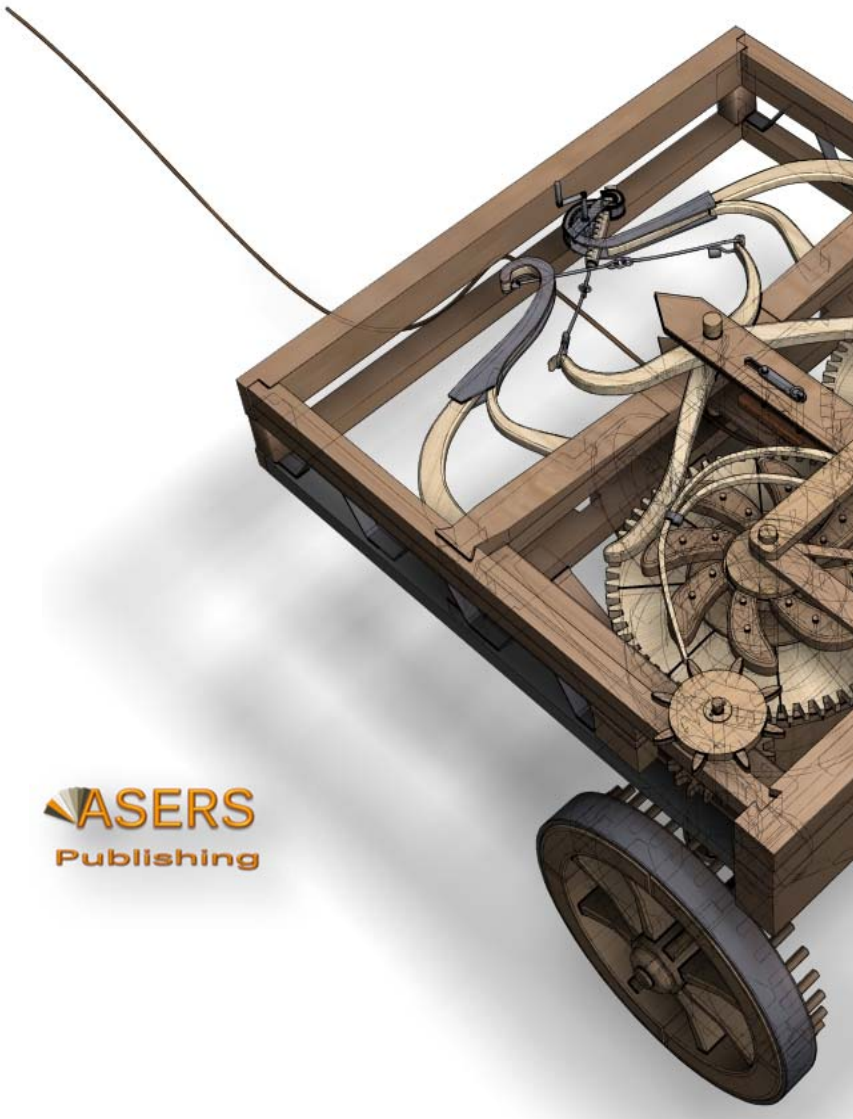

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Table of Contents:

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THE CLASSICAL POLITICAL ECONOMY: CRITICISM AND CONTROVERSY AROUND THE MID-NINETEENTH CENTURY

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Abstract:

The present work highlights the insufficiency of classical methodology to explain economic phenomena. The classical formulation left the notion of value unspecified, so there is room for the marginalist current, which abandons the classic value-work theory of the and replaces it with a theory of value based on marginal utility. The scenario changes and the attention is no longer paid to the classical social aggregates, but to individuals and economic subjects, passing from objectivity to the subjectivity of individual choices. From the marginalist principles, which still have an important influence today, the neoclassical school is constituted, which sets itself the objective of highlighting the advantages of economic liberalism, already highlighted by classical authors, but through different instruments compared to those used in the past. In this way we will have the opportunity to observe how the study of economics becomes more scientific, general and universal.

Keywords: positivism, classical school, marginalist school, neoclassical school, historical school, socialism.

JEL Classification: B12; B13; E14.

1. Political Economy and Positivism

Auguste Comte, founder of positivism, a doctrine which consists in the negation of philosophy, formulated the law of three stages, according to which the human spirit passes through the theological age, through the metaphysical age and finally through the positive one, in which it knows no other truth than those discovered and established by the sciences. On the basis of such a conception, the human spirit must limit itself to photographing reality and to detecting the regularity that it presents. There is no possibility for thought to reach the hidden essence of things (Gouhier 1933-1941, 244).

Comte goes on to say that philosophical discussions do not generate any progress, whereas sciences, based on observation, progress regularly, making discoveries. Therefore, only science reaches the truth and it deserves to be cultivated (Comte 1839, 270).

Positivism had a strong influence on the evolution of ideas both in France and in other European countries. In the 19th century, in France, the Republican party was largely inspired by Comte's ideas, but in the 20th century, Comte's main disciple was Charles Murras, *i.e.* the leader and theorist of the French nationalist movement between the two world wars. It may seem strange that positivism was, first of all, the doctrine preferred by the left-wing men, and then became that of the far-right representatives. But such a paradox can be explained. In the 19th century, Comte was venerated by the Republicans, because he was the apologist of science and the most

tenacious adversary of religion; in the 20th century, instead, he was used by the far-right wing, especially because of his social ideas (Denis 1973, 154).

Comte is a convinced opponent of the political economy, since he believes that it is very close to metaphysics. He also rejects the idea that political economy could be renewed through the use of mathematics. In fact Comte, professor of mathematics, hates mathematicians, who undoubtedly made life difficult for him:

"The dominion of the geometers over the speculative terrain is, of necessity, more or less oppressive, since it is naturally blind; and this precisely because of the complete independence of the work of these scholars [...], an independence which cannot but render them profoundly alien to the spirit and conditions of all the other positive sciences" (Comte 1942, 271).

It is not a matter of a discussion or a contrast on the nature of man. In fact, Comte declares that the laws of rational mechanics are the mechanical manifestation of a general law, equally applicable to all possible phenomena and in particular to political ones (Comte 1942, 378). Therefore, he is no less materialistic than the supporters of the mathematical method, but he thinks that the very complication of the object prevents us from proceeding in sociology as we do in physical science (Comte 1942, 399).

"Every idea of actual number and mathematical law, already being absolutely forbidden in biology [...], must be, a fortiori, radically excluded from the even more complex speculations of sociology. The only aberration of this kind, which could have deserved some serious discussion, would be the vain claim of a large number of geometers, who strive to make social studies positive on the basis of a chimerical subordination to the illusory mathematical theory of probability" (Comte 1839, 512)[1].

Having thus quickly liquidated the political economy, Comte can formulate the principles of the true science of society, that is, of sociology. Therefore, on the one hand, the true nature of human society must be established, noting the relationships between social events in the contemporary world: this is social statics. Then the laws of the evolution of humanity must be explained, that is to say, social dynamics must be defined. But these two parts of sociology must be elaborated and constructed using only three procedures: direct observation of facts; examination of pathological cases, which is equivalent to the typical experiment in physical sciences; historical comparison (Comte 1839, 158).

2. Auguste Comte's Social Doctrine

Comte notes that men are by no means equal, but that there are profound differences between them. Man is superior to woman, and she will always have a subordinate position in society. The white race is superior to the others: in fact, it alone is able to progress towards a positive society. Finally, even among individuals belonging to the same society, there are profound natural inequalities. In particular, only a small number of men, who form an elite, are able to access the life of culture[2].

Deeply convinced of his intellectual superiority, Auguste Comte, adhered to the teachings of reactionary philosophers of the Restoration era: De Bonald and De Maitre. As they did, in fact, he states that the great mistake of liberals is to start from the false principle of equality. Now, the economists that Comte knew were liberals (Smith, Ricardo, Say). Did they not want to show that individual interests can be mechanically reconciled by the simple action of the so-called economic laws? Comte points out that this is an absolutely impossible undertaking. The great idea of the founder of positivism is, instead, that the social order implies the existence of a temporal power and a spiritual power, which has the task of teaching the subordinates the acceptance of the social position they occupy, and the love for those who have to command (Denis 1973, 156-157).

Comte also believes that temporal power must belong to the industrial leaders and bankers who, on a practical level, have demonstrated their competence. Spiritual power, on the other hand, cannot fail to belong to the wise and especially to sociologists, since these, knowing the laws of the social world, are undoubtedly capable of arousing respect and love for order in all individuals, perhaps even arbitrating, if necessary, those conflicts of interest which can always arise in the context of human society (Denis 1973, 157). However, Comte differs from reactionary philosophers, defenders of the *ancien régime*, because he admits that the French Revolution was necessary to reach that positive age, which humanity had to reach after having passed the theological and

[1] See also the work of R. Mauduit, (1928, 92). This author believes that Comte was able to get to know Cournot's *Mathematical Principles of the Theory of Wealth* (1838), and that he hints precisely at this work when he speaks of 'heavy algebraic phraseology of subordinate imitators', or when he declares: 'Such an aberration simply constitutes, to my eyes, the involuntary testimony of a profound philosophical impotence' (*ibid*., 56-57).

[2] In most individuals, Comte explains, the affective faculties are much more important than the intellectual ones, because the front part of the brain, which is the seat of intelligence, is nothing more than a quarter or a sixth of the cerebral mass (Arbousse-Bastide 1957, 298).

metaphysical ages. The famous law of the three stages constitutes, therefore, his entire theory of progress, his social dynamics; and on closer inspection, it is a conception that substantially conforms to that of the philosophy of enlightenment, since it sees progress essentially as an evolution of consciences and not as an effective transformation of social structures.

In fact, Comte is convinced that it is now a matter of finding the natural order of society, and is a firm opponent of any revolutionary perspective. Ultimately, he develops propositions that are inspired by hatred of democracy and contempt for the great masses, which he considers incapable of rising to the level of a real intellectual life. All this leads Comte to deny that reason can represent the bond that unites men within social life. Certainly the wise have spiritual power, but they cannot in any way communicate it to the masses. The masses must simply admire the *élite* of intellectuals and obey the leaders of temporal power. Therefore, sociology will never lead to the formulation of propositions aimed at supporting and provoking a change in social institutions. Instead, it will proclaim that men are unequal among themselves and that each one must remain in his place; or rather, it will ensure that each one loves his own duty (Comte 1842, 533).

The founder of positivism also admits that the distinctions between social classes, as they are historically presented, are necessary. In fact, he writes:

"As far as the active or practical class is concerned, which necessarily includes the immense majority of men, the fact is that its own development, by now mature and almost complete, has already made its discriminating characteristics more and more marked and better detectable; in this way, the hierarchical theory must only rationalize those same distinctions which have been consecrated up to now by the spontaneity of customs". (Comte 1842, 585).

Undoubtedly, Comte admits that each individual has access to that social position which he is able to reach with his energies and his efforts. But in practice, he observes, the changes needed to reach a situation in which all individuals are able to express their own possibilities, will now, in the future, be very few, so that we are now close to the moment in which we can admit, in general, the inheritance of social functions:

"After the current confusion has been replaced, to a sufficient extent, by a first regular classification, such changes, even if they are always possible and if they continue to take place in practice, must nevertheless become essentially exceptional, since they will be strongly neutralised by the natural tendency of the professions to inheritance. In fact, in their majority, men do not have truly determined vocations and, at the same time, most social functions do not need them" (Comte 1842, 397).

Thus, a society can be established on this basis in which, among other things, the working-class question can finally be settled through resignation and love for leaders: exactly those feelings that spiritual power will be able to make triumph universally. Comte defines all this as a moral solution to the social problem.

"By making spiritual reorganization prevail and irreversibly dissipating the illusions relating to the unlimited effectiveness of the institutions in the strict sense of the word, positive philosophy will gradually, but permanently, give the popular votes the most suitable direction to enable them to achieve their normal satisfaction: and this is because such a philosophy will rightly make us appreciate the real superiority of the proper moral solutions over the merely political ones. The feelings and passions of the people, thus losing all anarchist character, will cease [...] to provide quacks and utopists with a dangerous means of disturbing society [...]. After having explained the natural laws which, in the system of modern sociality, regulate and determine the indispensable concentration of wealth in the hands of the leaders of industry, the positive philosophy will make it clear that it is of little importance, for the interests of the people, that capital be usually in these or those hands, provided that its use, in the normal line, proves useful to the whole of society" (Comte 1842, 602-603).

Comte's anti-democratic conceptions were further accentuated, after he founded the 'Religion of Humanity' in 1847, of which he proclaimed himself a high priest. Thus, for example, in the *System of Positive Polity* (1851-1954) he ended up writing:

"There can be no army without officers and soldiers; this elementary notion is as suitable for industrial as it is for military order" (Cherfils 1912, 34).

And he adds:

"The priesthood will compress ambition especially in the proletariat, since it is disastrous, as well as for their duty, their happiness, except in the exceptional case of aristocratic vocations. Usual submission, always ennobled by respect and often generated by affection, constitutes the fundamental condition of their office in society and of their personal dignity. Provided that the leaders provide them with stable security, their happiness cannot fail to exceed that of their leaders; in fact, while contributing above all to the common purpose, they can more easily participate in domestic life, suitably linked to the responsibilities of civil life" (Cherfils 1912, 186-187).

Comte is anxious to say that the heads of industry must be loved by their subordinates, but this paternalism is far from reassuring. In essence, he was the direct progenitor of those "technocratic" conceptions that are now so widespread in the Western world[3]. Actually, among the supporters of the government of technicians, we can find the refusal to consider political economy as a valid science. If, as Comte wanted to do, the instrument that allows us to understand the nature and contradictions of the capitalist system is broken, the thing that remains to be done is to preach submission to the masses, advocating 'moral solutions' for the most important political problems.

3. The Historical School of Economics

In Germany, as in France, the political economy was less studied than in England at the beginning of the 19th century. Moreover, the German-speaking countries were influenced by the French ideas, that is to say, by Jean-Baptiste Say's approaches. The old mercantilist theories did not easily give way to those of economic liberalism, as had happened in France. On the contrary, they are renewed and reinvigorated by Friedrich List, who maintains the idea that protectionism is indispensable to Germany, because of the delay of this country in terms of industrial development (Denis 1973, 160).

It is precisely the weak penetration of the classical political economy in Germany that explains the rapid flourishing, in Germany, of a school called "*historical*", which was established between 1840 and 1860. Its first representatives were Wilhem Roscher, Bruno Hildebrand and Karl Knies (Michaelides, Milios 2009). All these authors tried to establish an economic science on the basis of the examination of historical facts, as was claimed by Auguste Comte in the initial phase of his research. However, unlike the founder of positivism, the economists of the historical school admitted that the laws to be discovered must be laws related to the evolution of institutions, and not only of consciences and mentalities (Meoli 1972, 850-852). Thus they were moving towards social reformism, although they were, in their soul, profoundly opposed to any idea of revolution.

Under the impetus of the *historical school*, the history of economic events has made great progress. But it has also been shown that an ever more detailed knowledge of the events of the past does not, in itself, lead to a better understanding of those problems that liberal economists and socialist writers have proposed and faced. In fact, the problem of the causes of the enrichment and economic development of nations, the problem of the crises of overproduction and of the evolution of the conditions of the proletariat, and that in general of the distribution of income among the social classes, as well as of the future of economic liberalism and of the productive system based on private enterprise (Denis 1973, 161).

The German historical school considered that there was an absolute opposition between the science of history and the exact sciences, and that, for this reason, the laws defined by the political economy, on the basis of a method similar to that of physics, cannot have any validity. The position of this school is therefore different from that of Marx, who integrates the laws of classical political economy, which he reduced to laws relating to a specific economic system, within a general analysis of historical development (Fusteld 1970, 93-113).

The German historical school, by establishing such a radical opposition between the historical method and that of the economists, condemned itself to sterility. It discarded the classical laws, but never succeeded in discovering others. All this does not mean that it has not exercised a certain influence. It should be noted, in fact, that the essay published by Roscher on the *Theory of Crisis* (1849) is one of the main works dedicated to the problem of overproduction in the first half of the 19th century. In this essay the author criticizes Jean-Baptiste Say's 'law of markets', equally disproving the positions of all those who, like Ricardo, had adopted it. Roscher states that it is necessary to return to Lord Lauderdale and Malthus's idea, according to which the saving is really fruitful only to the extent to which it develops parallel to the demand for goods and services (Hutchison 1953, 356-357).

The historical school bequeathed the stimulus for a detailed search of the events of the past, for a documented knowledge of reality; and it was a inheritance that also strengthened the working methods of those researchers that were, in England, Ashley (1888), Cunningham (1882), Ingram (1888) and Rogers (1866-1902); in France, Levasseur (1859); in Germany, Sombart (1902), who analysed the sociological and psychological bases of commercial and industrial expansion, Weber (1904-1905), who highlighted the links between economic phenomena and religious faiths.

[3] It is pointed out that the importance of Comte lies essentially in the fact that he had already proposed, a century earlier, the central ideas of Italian fascism and German national socialism.

4. John Stuart Mill and the Defence of the Classical Economy

The criticism of Auguste Comte and the historical school did not in any way prevent the classical political economy from dominating the field for many years, although its main representative, from 1848, was precisely a philosopher who had a great admiration for positivism, namely John Stuart Mill[4].

In his work *A system of logic ratiocinatively and inductive* (1843), Mill admits that Comte, in formulating the 'law of the three stages', established the true principles of the 'general science of society', which is based on the observation of social facts. But alongside this discipline, Mill observes that there is room for a deductive sociology, of which political economics is precisely one of the branches. The latter discipline constitutes a particular science, since in order to study the social facts produced with a view to the acquisition of wealth, there is an opportunity to consider the human race as being busy solely with the acquisition and consumption of wealth itself (Mill 1848, vol. II, 496-497).

Is not the political economy, however, a false science, since it claims to define laws of universal scope, while society is constantly changing? No, Mill answers; and this because one can always take into account these changes in society, and then apply the teachings of economics on a case-by-case basis.

"And as whoever has solved a certain number of algebraic equations, can without difficulty solve all others of the same kind, so whoever knows the political economy of England, or even of Yorkshire, knows that of all nations, actual or possible, provided he have good sense enough not to expect the same conclusion to issue from varying premises" (Mill 1848, vol. II, 500).

Mill tries to reconcile the claims of the classical political economy with the point of view of the historian, rather than with that of Comte's sociology (Mill 1865, 261-368). It is easy to realize that his position implies an effective denial of history. In fact, in order to accept his position, one would have to admit that the historical process only determines non-essential modifications in society, but it is precisely this, on the contrary, that seems to be at issue.

Mill is fully convinced of the universal validity of the classical political economy; moreover, this is clear from his work, *Principles of political economy* (1848), which sets out the laws established by Smith and Ricardo (Mill 1848, vol. I, 481). The philosopher tries to introduce a distinction between the production of wealth, whose 'laws and conditions [...] partake of the character of physical truths' (Mill 1848, vol. 1, 233), and the distribution of wealth itself, which on the contrary, as Mill says, is an 'exclusively human institution' (Mill 1848, vol. I, 234). But Marx responded convincingly to this attempt when he demonstrated that production and distribution are closely related (Denis 1973, 163).

Mill states that there are two ways of distribution. The first is based on private property, 'that primary and fundamental institution, on which, unless in some exceptional and very limited cases, the economical arrangements of society have always rested,' (Mill 1848, vol. I, 235); the second is based on common property. But, having said this, he certainly believes that he can say that, for much longer, "the political economist [...] will be chiefly concerned with the conditions of existence and progress belonging to a society founded on private property and individual competition' (Mill 1848, vol. I, 252).

Thus, Mill's study of distribution was undertaken in the context of private property law. On the contrary, it becomes clear that the English economist only deals with phenomena that are typical of the capitalist system of production. Once again, history is practically omitted.

However, as Mill wrote in 1848, he could not close his eyes to the contradictions of the capitalist system. At the time when this last heir of the classical authors was drawing up his work, the liberal agenda had by then been applied in England. Home care for the poor was abolished in 1834; the corn laws were suspended in 1844 and abolished in 1846. Nevertheless, overproduction leads periodically to terrible disasters, and the problem of pauperism is not really solved. Thus English workers organize themselves to fight against the existing social order, and Mill, who sees socialist writers, cannot but take note of these facts.

"Hitherto it is questionable if all the mechanical inventions yet made have lightened the day's toil of any human being. They have enabled a greater population to live the same life of drudgery and imprisonment, and an increased number of manufacturers and others to make fortunes. They have increased the comforts of the middle classes. But they have not yet begun to effect those great changes in human destiny, which it is in their nature and in their futurity to accomplish" (Mill 1848, vol. II, 307-308).

On the other hand, Mill clearly recognizes the existence of commercial crises and tries to provide an explanation, attributing them to the fact that the expansion of credit allows a speculative rise in prices, which must

[4] On the evolution of the political economy in England between Ricardo and Mill, see the study by Meek (1950); For an in-depth study of the relationship between Mill's and Comte's thought, see Légé (2018).

necessarily be followed by a collapse, or at least a fall in prices themselves (Mill 1848, vol. II, 50-55). But what conditions does he propose, then, facing all these contradictions of capitalism?

First of all, Mill affirms that advanced economic societies, in order to allow a general improvement in the general standard of living, must limit their demographic development through birth control (Mill 1848, vol. I, 180-186). It is, therefore, the solution foreshadowed by Malthus, who, however, is now freed from all puritanism, and can be defined, in the most exact sense of the term, as a neo-Malthusian solution (Mill 1848, vol. II, 316-317).

Mill thinks that another remedy to the evils of society comes from the associationism between workers and entrepreneurs (today between capital and labour), as well as that of production cooperatives (Mill 1848, vol. II, 320-349). In this context, the English economist ends up assuming the positions of pre-Marxist socialism. But what stands out in his work is the hope that society can reach the *stationary state*, that is, a situation in which the mass of capital will cease to grow (Mill 1848, vol. I, 198-199).

Like Ricardo, Mill believes that the average profit rate tends to fall as a result of the increase in population and the cultivation of new land, from which an increase in the price of the means of subsistence cannot but derive (Mill 1848, vol. II, 286). Of course, he points out that the import of food from abroad and the export of capital can slow down the fall of the profit rate. His firm belief, however, is that this fall cannot but continue and lead the social systems of the various European countries to a halt in the accumulation of capital, precisely because of the disappearance of the very reason for accumulation.

Should we therefore be against such an event? Mill does not think so at all, because the fear of the stationary state in him is replaced by a completely opposite feeling:

"I cannot, therefore, regard the stationary state of capital and wealth with the unaffected aversion so generally manifested towards it by political economists of the old school. I am inclined to believe that it would be, on the whole, a very considerable improvement on our present condition. I confess I am not charmed with the ideal of life held out by those who think that the normal state of human beings is that of struggling to get on; that the trampling, crushing, elbowing, and treading on each other's heels, which form the existing type of social life, are the most desirable lot of human kind, or anything but the disagreeable symptoms of one of the phases of industrial progress [...]. The best state for human nature is that in which, while no one is poor, no one desires to be richer, nor has any reason to fear from thrust back, by the efforts of others to push themselves forward" (Mill 1848, vol. II, 304-305).

We are far from the initial conviction of the 'utilitarianists' that the growth of wealth should guarantee universal happiness. Hoping for a definitive halt in the accumulation, Mill recognized the uselessness of the philosophical foundations of the classical political economy. But here, too, his position is an attempt at compromise. In particular, he would like to preserve capitalism while halting the development of productive forces. Marx (1968, 933) first and then Keynes (1963, 358-373) have shown, by contrast, how impossible stationary capitalism is. The capitalist economy must progress or fail. Today, the dilemma has become quite clear and the fact that Mill has not highlighted it shows the weakness of his positions in this context.

5. The Forerunners of the Neoclassical School: Thünen, Gossen and Cournot

The classical political economy, in the formulations established by Stuart Mill, continued to be highly renowned until the second half of the nineteenth century. However, it should be noted that even before 1870 many works tried to broaden the scope of the 'marginal principle' on which the neoclassical school was to be built. Some economists of the classical era had used marginalist reasoning. Bentham, above all, attributed the utmost importance to the fact that the satisfaction given to a particular individual by the successive doses of the same good was decreasing. He showed that granting a poor man the last unit consumed by a rich man increased the satisfaction achieved by all individuals (Denis 1973, 166).

On the other hand, the Malthusian and Ricardian theory of land rents was based on marginalistic reasoning. The two economists said that the price of agricultural products depends on the cost of production on less fertile land (Denis 1973, 166-167); and today we would say that it depends on their marginal cost.

In the mid-nineteenth century, several attempts were made to give this type of reasoning greater precision.

From 1826, the German economist Erich von Thünen, in his work *Der isolierte staat in beziehung auf landwirtschaft und nationalökonomie* (Thünen 1826), tried to build a theory of the regional location of crops, relying on marginalistic reasoning. He states that the application of successive doses of work on a given piece of land must continue until the additional yield obtained through the last worker employed is equal, in value, to the salary he receives. Thus he also declares that the income from capital depends on the productiveness of the last applied dose of capital (Mynt 1848, 105; Argemí 2002).

A few years later, in 1854, Hermann Erich Gossen published a book entitled *Entwicklung der gesetze des menschlichen verkehrs und der daraus fliessenden regeln für menschliches handeln*, in which he affirmed the principle that consumers tend to establish equality between the satisfactions that have been obtained from marginal monetary units expended to purchase specific commodities.

This work remained completely ignored for many years; only later did it acquire such importance, when the economists Jevons and Walras took it into consideration. Gossen's analysis aims to deepen the laws of human conduct and focuses on three elements: a rigorous utilitarianism, the mathematical method, a theoretical approach to the characteristics of the choice (Steiner 2011). Gossen was attracted to Saint Simon and Comte, to their interpretations of religious sentiment and their faith in the future of humanity (Faccarello and Steiner 2008); he believed that the latter would be saved by science, and he considered himself a priest of this secular religion. Gossen, analyzing the balance of pleasures and pains (Van Daal 1996), rediscovered theorems that others had already foreseen, such as that of decreasing utility, but he addressed issues that no one had been able to see before him, such as the leveling of different satisfactions (Meoli 1972, 859-860).

The intensity of a pleasure is regulated by the famous law of decreasing utility, which the economist von Wieser later called 'Gossen's first law'. It highlights both the psychological and the more strictly physiological aspects of a person's behaviour and tells us how the greatness of the same pleasure, when we satisfy it in a continuous and uninterrupted manner, decreases up to a point of satiety (Gossen 1854, 4-12). But there was still the matter of how to achieve the best satisfaction of different needs with different intensities. Gossen then formulates his 'second law', which declares that "in order to increase to the maximum the sum of his own pleasure, a man who is free to choose between several pleasures, but who does not have the time necessary for their complete satisfaction, before completely satisfying even the greatest pleasure, must satisfy them all partially, however different their absolute greatness may be, and precisely in such a proportion that all pleasures remain equally great at the moment when their satisfaction is interrupted" (Gossen 1854, 12).

Gossen drew a number of considerations from the assumptions of the two laws that made conceptually evident certain misunderstandings that were found in the tradition of economic logic. He took up the question of the origin of value which, in his thinking, seems clearly subjective: something has value, in fact, if the pleasure it is able to procure can be measured (Gossen 1854, 24). The value must only be conceived in relative terms, since nothing in the outside world has an absolute value; the value depends entirely on the relationship between the subject and the object (Gossen 1854, 46). It is this relationship that gives value to the objects of the world according to a table of subjective estimates. Thus there can be things that are able to satisfy an immediate need, that is, consumer goods; then there are 'second class' commodities, which complete the attainment of pleasure and were later called complementary; and finally 'third class' commodities that can be used in the production of other commodities (Gossen 1854, 24-28).

In this way Gossen developed an increasingly detailed study of the market, to the point of making evident, in theory, the importance of human work, of the effort needed to satisfy certain desires. Gossen's theory of work is intended to clarify that at the beginning work does not generate pain but pleasure. This decreases with increasing effort and can turn into suffering. At a certain point, in fact, a situation of indifference is reached in which neither pleasure nor pain is felt; but beyond this, suffering takes over. In general, then, one can say that pleasure is increased by work until the resulting pain is lower than the satisfaction that can be drawn from it (Gossen 1854, 38). On the other hand, in the exchange, Gossen's *homo oeconomicus* follows a similar criterion: for him the exchange is advantageous until the values of the last units of the two goods he possesses become equal (Gossen 1854, 8).

However, the most important forerunner of the neoclassical school is still Cournot. He devoted himself to long and complex considerations on the most suitable method for renewing the political economy. The most important of his works was published in 1861 under the title *Traité de l'enchaînement des idées fondamentales dans les sciences et dans l'histoire*. But in 1838 Cournot had already published *Recherches sur les principes mathématiques de la théorie des richesses*, which is considered the true starting point of the mathematical theory of economics.

However, along the road of the use of mathematical disciplines in the field of political economics, Cournot was preceded by a number of authors, in particular William Whewell (1829). But he was a faithful disciple of Ricardo's, and he was only looking for a more precise exposition procedure; this is not the case of Cournot, who is much more influenced by Jean-Baptiste Say than by the great English economists.

The central part of the aforementioned 1838 work is a theory of monopoly prices. Cournot tried to determine, according to the demand for a good sold by a single company, the price that would be fixed by that company itself. First of all, he answers that, in the simplest case, the price sought is the one which guarantees

the maximum turnover for the company. If we know the relationship that exists between the demand D and the price p, that is, if we assume the function $D = f(p)$ is known, we must say that the turnover, equal to $p \quad f(p)$, is maximum when the derivative of the above expression is equal to zero, and that is when we have:

$$f(p) + p \cdot f'(p) = 0 \qquad (1)$$

More simply, nowadays we say that the revenue, *i.e*. the product of the price p and the quantity Q is maximum when the derivative of $p \cdot Q$ is equal to zero. This derivative, which in turn equals the absolute value of $p \cdot dQ$ minus the absolute value of $Q \cdot dp$, is defined as marginal revenue of the company.

From this first case, Cournot moves a more complex one, in which the product has a cost, and then in which we are in the presence of two sellers. Precisely with regard to this second case, Cournot (1838) went so far as to develop a so-called duopoly theory.

Cournot's considerations are an attempt to justify the thesis that, in economics, research can be conducted on the basis of abstract reasoning, as the best way to explain economic phenomena. Such principles are in some way interpreted as a reply to the conceptions of Comte and the historical school. Cournot only became aware of Comte's positivism in the last years of his life. He then clearly opposed it, declaring that science can in no way be constructed as a simple tracing of facts, since it implies and contains ideas, theories, which result from the creative activity of thought (Cournot 1872, 224).

In particular, against positivism, Cournot adopted Kant's point of view; he points out that there is a philosophy precisely because the value of those fundamental ideas that govern our ability to understand must be critically tested (Cournot 1872, 226). The conclusions reached by such a criticism will therefore not be characterised as positive facts: they will only be probable. But Cournot, who was also the author of the work *Exposition de la théorie des chances et des probabilités* (1843), affirms that probable conclusions have great value.

It was always as a disciple of Kant that Cournot affirmed the independence of morals and religion from rational knowledge (Mentré 1908, 503). Actually, it is precisely in Kant that one can find the origin of Cournot's conception of economic science.

The radical separation between ethics and science, supported by Kant, should have led the German philosopher to defend the theory that the science of man cannot be built on the model of the sciences of nature. Kant thought of making political economics a practical technique, that is, an applied science, which, although intended to deal with human phenomena, could have used the concepts used by the exact sciences (those that Kant analyzes in his theoretical philosophy), and not those moral principles that the philosopher had developed in his practical philosophy instead (Denis 1973, 169-170).

This establishes that, although economic activities are determined by man, they in no way imply the great issues of morality and freedom. And this Kantian attitude is that adopted by Cournot.

By studying the series of facts that can be observed, Cournot believes he can establish the following points: inanimate nature presents us with facts that can be known, because they can be measured and subjected to mathematical calculation; non-human living nature presents us with phenomena that cannot be known scientifically, since they escape mathematical subject; and finally, precisely in the field of human facts, we find again the possibility of applying the mathematical method, and in particular the calculation of probabilities, so that a scientific knowledge is possible again. Cournot wrote:

"What man does and what living nature does not know or does not want to do, is what is done according to logic and method, according to geometry and calculation, through combinations and dispositions of juxtaposed elements" (Cournot 1861, 372).

According to Cournot, such a characteristic of human facts depends on the singularity of a being that belongs to living nature, but that nature itself has provided with faculties capable of developing, in certain exceptional circumstances, in a completely abnormal way, that is, in a manner contrary to the plan followed by nature in relation to all living beings (Cournot 1861, 373).

Now, it is precisely this 'abnormal' disposition of man that, according to Cournot, provides the key to understanding the evolution of human societies, which, after having been at the root of organisms, become increasingly similar to mechanisms.

"Societies, even more than individuals, involve on a certain level progress to infinity. But if there is something in them that can be freed from the fatal law of ages, it can only be so because of a fixity of principles and rules, which are incompatible with the same proceeding in stages of vital movement. Thus an order of social facts is established which tends to highlight the categories or rational ideas to which my book was devoted. Now,

it is precisely this order that leads us back to a sort of mechanics or physics of human societies, which is consequently regulated by method, logic and calculation" (Cournot 1861, 373-374).

But this social mechanics will obviously be constituted by political economy: "will consist of that set of so-called economic sciences, which have as their essential object the study of the laws under whose order the products of human industry are formed and circulated, in societies sufficiently populated to ensure that individualities, so to speak, are deleted, and therefore, that only the masses subjected to a sort of mechanism very similar to that which regulates the great phenomena of the physical world should be taken into consideration" (Cournot 1861, 383).

Therefore, political economy is possible because there is something in man that can be freed from the fatal law of ages. However, another condition is also necessary: there must be such human activities that can be considered and studied with full abstraction from all ethical aspects. This condition, however, is guaranteed by the fact that, as Cournot observes, in society the law of averages cancels out the ethical nature of individual actions (Cournot 1861, 536-537).

Cournot always believed in the superior efficacy of an economy based on the free market. But to reinvigorate, on this point, the arguments of classical economists, he refers to the Darwinian theory of struggle for life and natural selection. Let us add to these arguments the fact that socialist solidarity, in whatever form it is practised, is always, in itself, a cause of weakening of national energies, since ultimately, there is still the problem of making the most valid, most active, most sensible and most thrifty members contribute to the maintenance of the weakest, laziest, most careless and, in short, least gifted members in physical and moral terms: of those members, in other words, that natural selection, through its ruthless processes, would inevitably sacrifice, in order to give the race all the superiority inherent in its nature (Cournot 1872, 260).

In fact, these ideas had already been elaborated and supported by Malthus and we should not be surprised if Cournot fully adheres to Malthus' theory which stresses the need to maintain social inequalities (Morselli 2017, 11), in order to limit demographic pressure (Cournot 1872, 252).

Cournot affirms that the scientific method coincides with the mathematical one, therefore it is necessary that economic freedom be the regime of the future, since only with this pact is social science able to develop. Moreover, Cournot writes:

"We therefore have good reason to believe that the conditions by which science is made possible are also those which, in the plans of nature, govern the appearance of the phenomena which science deals with: this is precisely what we have tried to establish, remembering which circumstances are increasingly favouring the advent of economic freedom. We thus strongly believe that socialism can only involve partial applications, whereas the principle of economic freedom cannot but increasingly govern, in all civilized nations, their internal organization, as well as their mutual relations" (Cournot 1872, 262).

Thus, ultimately, Cournot supported and defended the superiority of economic liberalism because it seemed to him that it was the condition for the development of social science. In a socialist regime, he affirmed, political economy, in its true form, the mathematical one, could not exist and therefore it must be thought that socialism could never triumph.

Conclusions

Socialist criticism of the classical approach did not affect its analytical structure. It helped to make evident some intellectual shortcomings, but it did not generate a new, or different, theoretical formulation.

The analysis of the classical economy underwent a slow critical process of some of its premises and of purifications of the more directly political implications that they could determine. This process affects the approach that Adam Smith had given to his research, and identifies the analytical difficulties that exist in his formulation of the theory of value. Thus, the classical formulation left the notion of value unspecified. On the other hand, it will appear increasingly unsatisfactory in terms of a generalisation of the phenomena of the cost of production and demand, as a growing capitalism brings about changes and complications in the characteristics of production capacity and the market.

Some economists we have examined take up an ancient analytical tradition, that is, the one that considers value in subjective terms, making the theory of value-utility come to light, which will then be perfected by the representatives of the marginalist school. The marginalists abandon the value-work theory of the classical authors, replacing it with a theory of value based on marginal utility.

Marginalists take the concept of value-utility from Bentham's utilitarianism and elaborate new theoretical assumptions, namely decreasing marginal utility and individualistic reductionism. The attention is no longer paid

to the classical social aggregates, but to individuals and economic subjects, passing from objectivity to the subjectivity of individual choices[5].

Through individualist reductionism, economic choices become detached from social phenomena, giving the study of economics a more scientific and universal nature. The decisions of individuals to satisfy their needs and to maximize their utilities are rational, and this very rationality represents the revolutionary element of the marginalists, and in this way, the latter develop a new approach of utilitarianism completely different from the utilitarian theories of the past. The classification of the social classes of the classical school disappears to give space to microeconomic analysis.

Since there is no theoretical continuity, the marginalist revolution is an overcoming of the classical logic; in fact, the marginalists abandon the classical Ricardian school, since it was taken up by Marx to demonstrate exploitation and support socialism. Rather than correct Ricardian theory, the marginalists prefer to elaborate a new economic theory on which the neoclassical school will be built. This school, which represents a response to the advancement of socialist theories, aims to demonstrate once again the validity of the conclusions of classical authors on the advantages of economic liberalism, but claims to perform such a task by relying on concepts and reasoning that are different from those of the first great economists. The economy is assimilated to the natural sciences, thus assuming the absolute nature peculiar to the laws of nature.

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DEMOGRAPHIC CHANGES AND ECONOMIC PERFORMANCE IN NIGERIA: AN EMPIRICAL INVESTIGATION

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Abstract:

Demographic changes in Nigeria are associated with divers' outcomes. This ranges from unemployment with figures ranging from 14 percent per annum for the entire population to 30 percent for the youth, coupled with stagnating economic performance. Ordinarily the growth of population could be to the advantage of a country in terms of the sheer size of its domestic market, better division of labour, and increased productivity through improvement in the ratio of labour force to population etc but the story may not always be the same for every economy. This study therefore investigated the extent to which demographic changes in Nigeria impact on economic performance in the country, as well as the direction of interaction between population changes and economic performance in Nigeria from 1970-2016. To achieve this, the study adopted Ordinary Least Squares (OLS) and Autoregressive Model (VAR) and found that fertility levels remain moderately high while the death rate drops especially infant mortality, leading to a larger population in Nigeria. Following the research findings, this study recommends that government should enact strict laws prohibiting early sex and marriage among youths. This early engagement on sex and marriage, the paper argued, will increase the mortality rate in Nigeria as a result of sexual infection, unwanted pregnancy as well as reduction in economic performance of the country. Also, serious public enlightenment campaigns should be mounted by government agencies, the mass media, radio, television, chiefs, churches, schools, mosques, home videos, etc. to send across the message that emphasizes the need and importance of family planning, healthy and improved living conditions for the people through population control.

Keywords: demographic changes, population growth, economic performance.

JEL Classification: J10; J11.

Introduction

In recent times, there have been widely noted demographic changes in Nigeria population, thereby asserting more and more pressure on government spending and general output in the country. It is commonly believed that economic growth leads population to live better, have longer lives and good health. Malthus argued that societies may experience considerable technological and social progress, but maintained that population growth overwhelms the means of sustenance, (Isuigo-Abanihe 2009, Akokuwebe and Okunola 2015, Adenola and Saibu 2017).

Demographic changes have constituted a powerful source of economic performance dynamics. Evidences have shown that one third of the rapid growth in the "Asian Tigers" in the 1970s and 1980s can be ascribed to demographic changes, partly explained by the direct effect of a larger share of workers in the population, and partly by the indirect effect of increased saving and investment (Bloom and Humair 2010) and (Bloom, Canning and Malaney 2000). Nigeria population grows faster than these Asian Tigers, yet one of the economic challenges facing Nigeria is the low GDP growth rates. Does this have anything to do with demographic changes?

For instance, population indicators in Nigeria show that Nigeria's population has more than doubled since 1960. Presently, based on the last census results 2006, Nigeria's population is over 140million, showing annual estimated growth rate of over 3 percent. It is then a fact that the rate of population increase in Nigeria is clearly unsustainable and; could directly or indirectly affects macroeconomic performance, (Nwakeze and Omoju 2011). As such, the average per capita GDP growth rate for Nigeria in the time period 1976–2010 was only half of the world average, and far below that of the Asian Tiger countries, even with the changing population.

Assessing Nigeria economic performance further, Nathan and Okon (2013) observed that the GDP per capita figures for Nigeria from 2000 to 2010 show that the economic status of the country is significantly worrisome. The contributions of oil rents to GDP for Nigeria indicates that Nigeria is over dependent on oil at the expense of other sectors of the economy and corruption assessment scores suggest that Nigeria is more corrupt, implying weak institutions. Decomposing the economy into oil and the non-oil GDP contributions, non-oil GDP share was 89.28% of overall GDP growth while oil sector contracted by 10% in 2010. And in 2011 non- oil GDP grew by 8.85%, compared with 8.51% in 2010, while oil GDP grew by -0.57% in 2011 compared to 5.25% in 2010. Thus, the non-oil sectors were the major growth drivers of the economy, contributing over 101.22% to real Gross Domestic Product growth in 2011.

Further evidence from the economic performance indicates that the population dependency ratio in Nigeria is over 80 percent while the fertility rate is over 5.01 children per woman. These are high figures compared with world averages, and are associated with poor educational performance, poor health, lower survival capabilities, general resource dilution, and diminished access to public resources, such as health and education, poor quality and low labor force participation by women, low per capita incomes, which are all outcomes known to increase poverty and inequality, (Nkang 2009). According to Fasoranti and Ofonyelu (2013), the Nigeria population changes have been very significant in affecting her age structure of patients demanding for health care. This has resulted in medical innovation in disease treatments and controls. The impacts have been improved fertility rate (through improved health facilities and saving of lives) and reduction in number of the formerly-known chronic diseases in the country, such as leprosy, measles, polio, etc. It is noted that Nigeria's fertility shows no decrease except in 1990s, and then only a moderate decline, (Nwanosike, Ikpeze and Ugbor 2015). A 10% fall in fertility is often taken as marking the onset of a significant population changes; by that measure the Nigerian population changes could be said to be in constant motion, (McNicoll 2011).This evidence is indeed not favorable.

It therefore appears that Nigeria demographic profile creates challenges instead of opportunities. Ordinarily the growth of population could be to the advantage of a country in terms of the sheer size of its domestic market, better division of labour, and increased productivity through improvement in the ratio of labour force to population as well as enhancement of its political and military power. But population growth in Nigeria is associated with unemployment with figures ranging from 17 percent per annum for the entire population to 60 percent for the youths because job opportunities are fewer than the number seeking for them, and stagnating economic performance because a large proportion of available resources is consumed instead of being invested to generate growth, (Nwosu, Dike and Okwara 2014).

According to Anaele (2010), the Nigerian economy is unable to absorb millions of school leavers into formal employment. Nigeria for instance, with an annual population of about 3 million leaving school can only absorb about 10% of this in formal employment. This is because the economy's job creation rate cannot keep pace with the school outputs as well as the job-destruction rate. Comparing the unemployment situation with our population size, we can then appreciate the enormity of our population problem. This is compounded by non-

existence of an aggressive population control policy, as the dynamics of Nigerian population continue to reinforce the population increase and its attendant negative consequences on the economy and its people, (Anaele 2010). Hence, it looks like Nigeria has become a mere big country, rather than a progressing economy. This is because, the employment opportunities generated is not sufficient to absorb the country's growing pool of labour. The efforts of governments of Nigeria to feed her peoples and also provide quality social services for them are being frustrated by rapid population growth, coupled with the beliefs about the value of children as gifts from above. One may now wonder if Nigeria has been trapped by Malthusian postulation.

From the fore going, it is clear that discussing the issue of demographic changes and economic performance is very vital. Interestingly, not many studies have investigated this relationship in Nigeria. Few studies such as Adewole (2012) and Nwosu, Dike and Okwara (2014), focused on population and economic growth but this current study takes a deeper look at the dynamics of demographic changes (including other variables) apart from population growth alone. Specifically, this study focuses on ascertaining the extent demographic changes in Nigeria impact on output productivity in the country. It also ascertains the direction of interaction between demographic changes and output in Nigeria. This is pertinent now considering the pattern of demographic changes relative to the economic productivity now. This portends serious economic concern to the nation's economy now. The rest of the paper is structured as follows: Section 2 looks at the review of literature, while section 3 is focused on the methodology. Chapter 4 presents the results and discussion, while the paper is concluded in section 5.

1. Review of Literature

1.1. Theoretical Underpinning of Population Changes

There have been arguments on the issue of population/demographic change and it implication on the economic performance. Prominent amongst such include contributions of the classicalists, the socialist and the new demographic views. Though, population changes was however, made popular by Thomas Robert Malthus, in his arguments about how and why population changes. In his works, *An Essay on the Principle of Population* seeks to explain the natural pushes and pulls of population fluctuation. Malthus' theory consists of principles, the first of which states that human population grows at a geometric rate, or exponentially with each generation. His second principle points to the difference between this geometric rate of growth for human populations and the arithmetic rate of food production, which means that with each generation, the food supply will only increase by the same set number.

Plato in his opinion saw large population as a source of political, economic and military strength of a nation. He maintained that the growth of dense population is generally favourable to the maintenance and increase of imperial power. Economists such as J.S. Mill and J.M. Keynes supported his theory whereas others, especially, sociologists, have argued against it. According to them, the widespread poverty and misery of the working class people was, not due to an eternal law of nature as propounded by Malthus but to the misconceived organization of society. Socialists like Marxist-Lenists on the other hand argue that resources are not always scarce to care for the changing population, but the problem lies more with how they are distributed in the society. Karl Marx went one step further and argued that starvation was caused by the unequal distribution of the wealth and its accumulation by capitalists. It has nothing to do with the population changes. Population is dependent on economic and social organization. The problems of overpopulation and limits to resources, as enunciated by Malthus, are inherent and inevitable features associated with the capitalist system of production.

In the Recent time, demographers have generally examined trends in the population with the attendant postulation of demographic transition theory. Demographic Transition theorists believe that countries all over the world will follow trends of the advanced countries. In other words, the Third World countries will ultimately attain demographic stability. The theory suggests that societies pass through the following stages in the process of change. These transition stages are explained as follows:

Pre-transition stage characterized by high and fluctuating birth and death rates with little population growth.

- Stage I: High birth rates and declining death rates with rapid population growth;
- Stage II: Low birth and death rates with slow population growth;
- Stage III: Birth and death rates both decline appreciably leading to zero population growth.

The theory holds that pre-industrial societies were characterized by stable populations which had both a high death rate and birth rate. It postulates a little and slows population growth. The theory states that the high mortality rates characteristic of undeveloped areas will decline before fertility rates which are also high, relative

always resulted in a fall in the standard of living due to the rather severe limits to the technical progress in agriculture as pointed out by Malthus. This prompted Clark, (2007) and Minh, (2012) to state that income levels before the nineteenth century could not escape the Malthusian equilibrium due to the very low rate of technological advance in all economies.

During the transition population, growth and changes in the age structure of the population are inevitable, if appropriate policies are pursued (Ingle and Suryawanshi 2011).

1.2. Empirical Literature

Studies abound that establishes that demographic structure can have be related to economic growth either positively or negatively. For instance, Wei and Hao (2010) studied demographic structure and economic growth in China. The paper focused on the economic influence of demographic change in the Chinese setting from1989 to 2004. Adopting the growth equation, the empirical results of their work showed that changes in demographic structure have helped to improve the economic growth in China since 1989. Song (2013) in another study, examined the effects of demographic changes on economic growth from 1965 to 2009 in thirteen Asian countries. Using OLS regressions which was ran using pooled data, the results revealed that the young population and the total population had negative growth impact on the economic growth of the selected Asian countries. On the other hand the ratio of the working population showed positive impact on economic growth in those countries in the study.

Another paper written by Crespo, Cuaresma, Lutz and Sanderson (2013) utilized the dynamic panel GMM methods in investigating the relationship between education, age structure, and economic growth in 105 countries. The results clearly showed that there is no evidence that changes in age structure affect labor productivity once the effect of human capital dynamics is controlled for. The paper concluded that since it is the key in enhancing productivity and income growth, the advancement in human capital development is to be given serious consideration. Furthermore, Wang (2013) analyses the economic and distributional effects of demographic transition using the integrated recursive dynamic computable general equilibrium (CGE) model. The results revealed that due to nature of the demographic transition in China coupled with high cost of labor force, the population aging slow down China's economy growth rate. Again, Zhang, Zhang and Zhang (2015) in their paper examined the economic implications of demographic age structure in the context of regional development in China. In order to extend the development accounting framework, the authors incorporated age structure which was duly applied in the use of a panel data set of 28 Chinese provinces. Their outcome states that changes in age structure, as reflected by shifts in both the size and internal demographic composition of the working-age population, are significantly correlated with provincial economic growth rates.

In another recent study, Adenola and Saibu (2017) investigated the relationship between demographic change and economic growth in Nigeria. The study adopted fully modified ordinary least square estimation technique, and the results reveal that among the several macroeconomic variables that may affect economic growth in Nigeria, exchange rate, inflation rate and fixed capital formation were observed to be significant drivers of economic growth in Nigeria while population changes is insignificant (although positive). The paper concludes that for population growth to ensure sustainable ling run growth, the economic productive capacity of the nation must be expanded.

To empirically investigate the impact of population changes on output performance, Onwuka (2005) tests the association between population growth and economic development in Nigeria between 1980 and 2003 and found that growth in population outweighs that of output and this has hindered the capacity of successive governments to efficiently provide social services to the people, thereby negatively affecting development. The study contention, that curbs on population growth through appropriate policies that would integrate the country's population programmers into the mainstream development efforts are necessary so as to witness higher per capita consumption of social services by the citizens which ultimately would boost their access to the benefits of development. The same conclusion was made by Kudrna, Chung and Woodland (2015) in the dynamic fiscal effects of demographic shift in Australia.

Similarly, Nwosu, Dike and Okwara (2014) adopted time series from 1960 to 2008 to investigate role of population growth on economic growth in Nigeria and how economic growth is effected through population growth. The empirical results support evidence of unidirectional causality between population growth and economic growth. The study also found that there is a sustainable long run equilibrium relationship between economic growth and population growth. The study suggests that Government should make concerted effort to check population growth rate. The study concludes that any population growth that occurs too fast will have diminishing returns or create a circumstance where economic growth is stagnating.

Adopting a different methodology, Adewole (2012) examines the effect of population on economic development in Nigeria using trend analysis with the scope spanning between 1981 and 2007. The study revealed that population growth has positive and significant impact on economic sustainability proxied as real gross domestic product (RGDP) and Per Capita Income. Though, Nikulina and Khomenko (2014) noted that interdependence of demographic and economic development of a region can be confirmed by identifying demographic and economic process channels. Considering the demographic changes in particular, changes in cohort size, female labor force participation and migration, influence the dynamics of wage rate profiles Anders (1992) suggests that there are demographic effects on wage rate profiles, although they are usually rather small. On the other hand, Sarel (1995) examined the effects of demographic dynamics on the measured rates of economic growth. The study however found relative productivity among different age groups. While, Anna-Maria and Shankha (2014) asserted mortality transition that is not accompanied by improving morbidity causes slower demographic and economic change.

1.3. Demographic Efforts and Policies in Nigeria

A country's population level depends on its fertility and mortality rates and the changes of these two rates are determined by population policy. Population policy is a government's effort to plan or influence demographic variables such as fertility, mortality and migration towards national development, (World Economic Forum 2014).

In Nigeria National population plan or policy was notably absent and government denial of the need for birth control until 1988. Official statements mildly in support of birth control began to be issued in the 1970s, and a National Population Council was established to formulate and coordinate policy in 1988. The national policy on population was put in place with the main aim of reducing population growth rate through voluntary fertility regulation. The policy encourages the voluntary regulation of the number of children which a woman should have to four, with the year 2000 set as the target year by which 80% of the woman should attain the limit (Ojo 1997 and Anaele 2010). Of course, this initial effort encountered policy inaction persistently.

Eventually, some strengthening of goals took place under President Obasanjo on January, 4, 2004 policy statement that called, inter alia, for "progress towards demographic transition to reasonable birth rates and low death rates." Full country-wide access to contraceptive services was envisaged and the target set of a decline in total fertility of 0.6 children every five years. Within this era, Nigeria's demographic profile has been characterized by high growth, its youthful nature – almost half of the population is under 15 years of age – rapid urbanization, high adolescent maternal mortality and high-risk pregnancies, (McNicoll 2011).

Consequently, the country's National Population Policy 2006 cited in Anaele (2010) was based on certain key principles and targets:

- To achieve a balance between population growth rate and available resources;
- To achieve a reduction of the national population growth rate to ≤ 2% by the year 2015;
- To achieve a reduction in total fertility rate of at least 0.6 children every five years;
- To reduce the infant mortality rate to 35 per live birth by 2015;
- To reduce the child mortality rate to 45 per 1000 live birth by 2015;
- To reduce maternal mortality ratio to 125 per 100,000 live birth by 2010 and 75 by 2015.

This implies that there is concomitant effect of population factors on the well-being and quality of life of all Nigerians. Following adoption of the national population policy, an institutional framework for implementation of the policy was put in place in 2008, comprising the National Council on Population Management to be chaired by the president, a population advisory group and a population technical working group. A strategic plan was approved in 2008 and a multi-sector, multi-tiered approach to implementation was adopted, (World Economic Forum 2014).

With all these, implementation of the national policy has been dismal. As a consequence, Successive DHS surveys record Nigeria's women and children still have high preventable morbidity, maternal mortality, early marriage and adolescent pregnancy with the resulting complications. The country has a persistently high, unmet need for contraception among women in all states (just 10% of currently married women were using a modern method of contraception, chiefly condoms and injectables) and across all geopolitical zones, ethnic and religious groupings, (NDHS 2008).

However, Nigeria's commitments announced at the London 2012 Summit are yet to be fully implemented despite initial optimism. The commitments include increasing the federal government's budget allocation for family planning commodities to $11.5 million annually, at least until 2016, to raise the contraceptive prevalence rate by 2% annually and save the lives of 23,000 women, (World Economic Forum 2014). Effective management of the National population program is a national priority which demands the commitment and support of all

stakeholders, policy makers in government and private sectors, Non-governmental groups, mass media and the general public.

2. Methodology and Models

The objective of this study is to examine the nature of causation between economic performance in Nigeria and demographic changes and also check the actual impact of demographic changes on economic performance in Nigeria. To achieve the above objectives, the Ordinary Least Squares (OLS) method and Autoregressive model (VAR) were adopted because of the inclusion of other variables of interest apart from the core variables population growth rate and real Gross Domestic Product which was used as a proxy for economic performance. The Ordinary Least Squares (OLS) method was adopted as a result of the intuitive nature and mathematical simplicity compared to maximum likelihood (Gujarati and Porter 2009). Vector autoregression (VAR) is a statistical model used to capture the linear interdependencies among multiple time series. VAR models generalize the univariate autoregression (AR) models by allowing for more than one evolving variable. However, a simple log-linear regression will be used in analyzing the effect of population growth on economic performance in Nigeria from 1970 to 2016 and it is expressed as;

$$RGDP = f(POP) \tag{1}$$

The equation (1) is bi-variable model specification of the effect of population changes on economic performance. We can extend the bi-variate model into a multivariate regression model till maintaining Occam's razor's Principle of parsimony, by using some demographic variables or indicators to depict the population changes. This is, these indicators will give us a true picture of the effects of population changes on economic performance in Nigeria, thereby reduce the pressure on the error term, as well as giving us a better prediction. This is stated as thus:

$$RGDP = f(PopR, Mort, FR, LF) \tag{2}$$

Equation (3) can be expanded further by including other control variables that affect population.

$$RGDP = f(PopR, Mort, FR, LF, Health, ExEdu) \tag{3}$$

Thus, we can express the econometric form of the model (equation 3) in logarithm to measure percentage change, or the growth rate in economic performance (RGDP) for an absolute change in the regressors (demographic variables). Special feature of the double-log model is the assumption that the elasticity coefficient between the dependent and independents remains constant throughout. Another feature of the model is that $\hat{\alpha}$ and $\hat{\beta}_t$ are unbiased estimates of α and β_t, and the slope coefficient β_t measures the elasticity of Y with respect to X, that is, the percentage change in regressand (Y) for a given (small) percentage change in regressor (X), (Gujarati 2004).

$$InRGDP_t = \alpha_o + \beta_1 InPopR_t + \beta_2 Mort_t + \beta_3 InFR_t + \beta_4 InLF_t + \beta_5 Inhealth_t + \beta_6 InExEdu_t + \mu_t \tag{4}$$

where: RGDP = real gross domestic product proxy for economic performance, Mort. = mortality rate, FER = fertility rate, LF = labour force, Heal = health expenditure, Edu = expenditure on education, and In = natural logarithm.

This model is in line with Malthus postulation, which he argued that population growth is becoming over populated and available resources are timeless and not enough. This study further expresses the nature of interaction between population changes and economic performance, using Granger causality test. This is to determine the direction of causality between economic performance proxy by real gross domestic product and population changes components (variables). The demographic indicators used here to proxy population changes are; mortality rate, fertility rate, labour force, health expenditure and expenditure on education. The Granger causality functional form can be specified as follows:

$$RGDPt = \sum_{i}^{n} \alpha_1 pop_{t-i} + \sum_{j}^{n} \beta_j RGDP_{t-j} + \varepsilon_{1t} 5 \tag{5}$$

$$pop_t = \sum_{i}^{m} \alpha_i RGDP_{t-i} + \sum_{j}^{m} \beta_j pop_{t-j} + \varepsilon_{2t}$$

Note: pop_{t-i} in equation (5) is proxy for all the demographic variables that will be entering the model as noted in equation (4). This is in attempt to keep the model specification concise. Again, we will extend this Granger test to multivariable causality through the technique of Vector Autoregression (VAR). This is because of VAR's ability to consider multivariate equations, where ε_t's are the impulses or innovations of the VAR model. We shall apply the probability value at 5% to ascertain the direction of Granger causality between the variables of interest. The study covers the periods from 1970 to 2016. The choice of the period is due to availability of data. The data was obtained from Central Bank of Nigeria Statistical Bulletin and World Development Indicators.

3. Results and Interpretation

The unit root test is carried out to know whether the mean value and variances of the variables are time invariant, that is, constant over time. The unit root test for stationarity is applied using the Augmented Dickey Fuller (ADF) test at 5% critical value and the result is presented below as Table 1 with the null hypothesis being that the series has a unit root if the t- statistics is less than the critical value at (5%), otherwise the study rejects. The summary of the result is presented below as Table 1.

Table 1. Unit Root Test Result summary

Variables	ADF stat	Crit.value at 5%	Order of Integration
RGDP	-6.010889	-3.518090	I(1)
FERT	-11.04112	-3.634233	I(1)
POP	-3.451753	-2.951125	I(1)
LF	-6.87119	-3.523623	I(1)
MORT	-4.92898	-3.526609	I(1)
HEAL	3.121431	-2.931404	I(1)
EDU	-4.50493	-2.93694	I(1)

Source: Researchers' computation

From Table 1, it can be observed that all the variables were stationary after taking their first difference. This means that these variables were integrated of order one; I (1). The variables were tested basically at 5% critical. The models were further subjected to the test of multicollinearity and it was confirmed that there is no pair-wise correlation coefficient that is in excess of 0.8, hence, they cannot be said to be collinear.

Furthermore, the augmented Engle-Granger (AEG) test was employed to validate the co-integration test hypothesis which state that; reject H_O if the absolute value of the ADF test statistic is greater than the absolute critical value at the chosen level of significance for the generated residual series; otherwise, do not reject H_O. The result of the co-integration is presented in Table 2 below:

Table 2. Co-integration test result

Variable	t-ADF	Critical values		
		1%	5%)	10%
μ_{t-1}	-6.174988	-3.689194	-2.971853	-2.625121

Source: Researchers' computation

From the Table 2, since the absolute value of t-ADF is greater than the critical values, at 5% level, that is |-6.174988| > |-2.971853|, we therefore do not reject H_o and conclude that there exists cointegration among the variables *i.e*. there is a long run relationship among the variables of the model at the chosen critical level. Hence are co-integrated. This result differs significantly from Anaele, (2010) and Adenola and Saibu, (2017) who found that no long run relationship exists between population changes and economic performance.

The existence of cointegration among the variable of the model which we verified above necessitates the need for the postulation of the Error Correction Model (ECM). This model aims to link the short run dynamics with the long run equilibrium. In the ECM, the coefficient of the differenced variables reflects the short run dynamics. In this model, all the variables conform to the a priori expectation, except labour force. The coefficient of -0.134065 implies that about 13% (-0.134065 x 100%) of the equilibrium error will be corrected in the next period. The result of the ECM is presented Table 3.

From the result, error correction model (ECM) showed that demographic changes in Nigeria significant impact on economic performance in the long run. However, the ECM revealed that Fertility rate, Mortality rate and Labour force have negative impact on economic performance in the short run, while Education expenditure and health spending have positive impact on economic performance in the short run. This shows that present

value of the dependent variable adjusts more slowly to changes in the independent variables (demographic variables). Although, the negative effect of labour force on economic performance can be associated to unemployment that characterized the Nigerian labour Force.

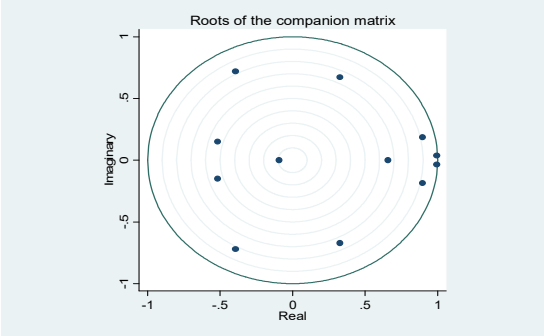
Table 3. The Error Correction Model result

Variables	Coefficient	Std Error	t- Statistic	Prob.
C	1.5	1.9	0.792649	0.4364
D(Pop)	5.71	6.35	0.899348	0.3782
D(Fert)	-1.01	2.80	-0.361986	0.7208
D(Mort)	-3.27	1.04	-3.144363	0.0042
D(Edu)	6.889207	3.490476	1.973716	0.0611
D(Lf)	-0.161844	0.064809	-2.497236	0.0205
D(Heal)	3166342.	627088.3	5.049276	0.0000
ECM(-1)	-0.134065	0.065937	2.033226	0.0543
	R^2 = 0.618706	Adjusted R^2=0.514716		

Source: Researchers' computation

To ensure sufficient condition of the model prescription, the study carried out a stability test on a VAR model, since the result of the model will be used for forecasting. Essentially, the necessary and sufficient condition for stability is that all characteristic roots lie inside the unit circle, (Nwanosike and Okafor 2015). In other words, using the Eignevalue stability condition, VAR satisfies stability condition if all the Eigenvalues lie inside the unit circle. The result obtained in this study is graphically presented as follows in Figure 1.

Figure 1. VAR satisfies stability condition



Source: Researchers' Estimation using Stata

From the above diagram, it is evident that all the Eigenvalues lie inside the unit circle. Thus, VAR satisfies stability condition and any form of forecasting done with the model is reliable. Hence, the model is not a spurious regression. The models having satisfied the pre-diagnostic tests, therefore further the analysis by presenting the results of the OLS regression estimates for equations (4) which captures the extent population changes in Nigeria impact on economic performance in the country.

Table 4. OLS Regression Result for model 1: Dependent variable = log[6] (RGDP)

Variables	Coefficient	t-stat	p-value	
Pop	7.757954	3.94852	0.0003	
Fert	31.21959	5.45348	0.0000	R^2= 0.9512
Mort	-1.706062	-0.32314	0.7484	
Edu	0.217529	2.21155	0.0333	Adj R^2 =0.9433
Health	4.725715	1.666347	0.1041	
LF	5.135786	3.06220	0.0041	F-Prob=0.0000
Const	-203.1868	-4.20260	0.0002	

Source: Researchers' computation

[6] The log form of the variables was used to scale down the data and measure the rate change of both the dependent and independent variables.

The result is presented Table 2, where real gross domestic product (RGDP) is proxy for output productivity, is used the dependent variable, (see Table 2). From the regression result in Table 2, the signs of its coefficients conform to the standard economic theory which postulates that population changes enhance economic performance. The R^2 is 0.9512, implying that the model explained about 95% of the total variation in economic performance (real gross domestic product). The t – statistics reported in the table 2 are all significant except the t- statistic for expenditure on health and mortality rate which could imply that effort on health sector through funding to reduce mortality rate. While the F - probability of 0.000 suggests that the overall model is significant and hence the results are robust and reliable.

From the result, the coefficients of the variables, expenditure on education, labour force and fertility are positive and in conformity to the standard economic theory supporting them. For instance, the elasticity of economic performance (RGDP) with respect to population growth is about 7.7580, suggesting that if population growth increases by 1 percent, on average, the economic performance will increase by about 7.76 percent, while a percent increase in labour force, on average, will result to 5.14 percent increase in economic performance as in line with the postulation of economic theories. This implies that the percentage change in regressand (economic performance) for a given (small) percentage change in regressors (Pop, LF, Mort, Heal, Edu and Fert) are summarized in Table 2 about. This is in agreement with Adewole (2012) and Nwosu, Dike and Okwara (2014) findings that there exist positive relationship between population growth and economic development in Nigeria from 1960 to 2008.

In testing the objective two of this research work which is to determine the direction of interaction between population and economic performance, a mulit-variate Granger causality test was conducted as specified in equation (5). According to the concept of Granger causality, 'X causes Y' if and only if the past values of X help to predict the changes of Y , while, 'Y causes X' if and only if the past values of Y help to predict the changes of X .

Table 5. Summary of Granger Causality Test at lag (1)

VARIABLES (LAG 1)	RGDP	FERT	MORT	EDU	HEAL	LABOUR
RGDP	0	133.04* (0.000)	30.946** (0.000)	10.186** (0.000)	360.91* (0.000)	12.116* (0.000)
FERT	2.5833 (0.275)	0	20.042** (0.000)	0.42427 (0.809)	18.96** (0.000)	5.5985 (0.061)
MORT	15.214** (0.000)	337.07** (0.000)	0	3.1737 (0.205)	96.182** (0.000)	88.788** (0.000)
EDU	19.27** (0.000)	7.1144 (0.029)	3.9909 (0.136)	0	35.942** (0.000)	2.6072 (0.272)
HEAL	7.0676 (0.029)	44.608** (0.000)	14.461** (0.000)	21.289** (0.000)	0	6.9575 (0.031)
LABOUR	4.15 (0.126)	46.204* (0.000)	14.257** (0.000)	0.19103 (0.909)	7.0423 (0.030)	O

Researchers' computation using STAT 11.0

The granger causality null hypothesis states that Y does not Granger cause X. From the Table 3, there exist a causal relationship between the asterisk (*) variables in the model at the 5 percent level of significance. That is, there is a causal relationship between LABOUR & FERT, RGDP & HEAL, RGDP & LABOUR, RGDP & FERT, FERT & RGDP, FERT & EDU, FERT & LABOUR, MORT & EDU, EDU & FERT, EDU & MORT, EDU & LABOUR, HEAL & RGDP at 5% level of significance as in line with Nwosu, Dike, and Okwara (2014). The result is summarized in the Table 3.

Hence, the null hypothesis X does not Granger because Y is rejected at the 5 percent level of significance where "X and Y" represents the cause and effect variables. The result further shown that there is no causal relationship between and among the non-asterisk (*) parameters at 5% level of significance for LABOUR & EDU, FERT &RGDP, FERT & EDU, FERT & LABOUR etc as show in the Table 3.

In other words, the null hypothesis of X does not Granger because Y is accepted at the 5 percent level of significance. Furthermore, the result shows uni-directional causality between RGDP & FERT, RGDP & HEAL, RGDP & LABOUR and LABOUR & FERT as shown in the causality table with one asterisk (*). All other variables marked and indicated with two (**) exhibited bi-directional causality effects as shown in the Table 3. Note that the values in the brackets represent the probability values at two degrees of freedom.

4. Discussion and Findings

The study reveals fertility rate and mortality rate as the true determinants of population changes in the economy. Following the arguments of the research findings, the Nigeria population growth rate of 3.3 per cent per annum suggests a population doubling with the implications of the increasing rate for the future size of the population, and the ability of the economy to grow commensurately to cope with the increase in population size. The study found that the fertility rate remains moderately high of about 31% while the mortality rate drops to 1.7% especially infant mortality. Children under five are no longer dying at such high rates due to improve healthcare (high health and education expenditure), leading to a larger population in Nigeria.

The results of our estimate from 1970 -2016 confirm study's a priori expectation about crude population growth (proxy with fertility and mortality rate) and economic development in Nigeria. A priori, an increase in the crude population growth rate through increased birth rate and decrease in the death rate will induce economic growth to accelerate. From the study, a 1% increase in crude population growth leads to 7.8% increase in the output productivity. This is relatively and could be attributed to poor population planning technique and implementations which have resulted to unemployment in Nigeria. This finding is in line with the observation of Anaele (2010) that the policy of reducing number of births without placing upper boundary on the number of children a family should have is a serious flaw. Population policy must be concerned with controlling the number of persons in a country, the rate of growth, among others, hence, it is not out of place to specify the number of children a family should have.

The study further revealed that high population growth in Nigeria is not proportional to economic performance and growth in the country. Early studies like Adewole (2012) and Nwosu, Dike and Okwara (2014) asserted that population growth influence real gross domestic product (RGDP) positively. This can be justify by uni-direction causality between RGDP and Labour force in Table 3. This could be so because labour force in Nigeria is dominated by unemployed man power (labour force). In principle, high number of working-aged people implies more productivity and more economic growth. The opposite is the case in Nigeria situation. No wonder NUDP, (2012) observed that 14 million Nigerians are unemployed, and that unemployment rate increased 19.7% in 2009, 21.1% in 2010 & 23.9% in 2011. As such, Nigeria is one of the 15 hotspots countries in Sub- Sahara Africa currently experiencing high rates of population growth and high projected declines in agricultural production.

Finally, the result unveiled that at the country's current level of population changes seen to be a burden to development instead of benefit to the economy as postulated by Neo-classicalists that population growth is correlated to technological advancement and positive economic outcomes. This is deducted from the result in Table 2 where health expenditure (Heal) has negative relationship with economic performance. This is similar to Olayinka (2011) argument that population grows but capacities of the population are not developed to sufficiently drive growth, hence, the majority of the population will be experiencing poor health care or have low life expectancy.

5. Policy Recommendations

From the research findings on demographic changes and economic performance in Nigeria, the following research policy recommendations were suggested:

- There should be a Reversal of the legislative law permitting 11 years old children to engage in sexual intercourse. This is because early engagement on sex and marriage will increase the mortality rate as a result of sexual infection, unwanted pregnancy and complication from child bearing. Hence, the legislation should rise the minimum age for sexual affair to 14 years, which is the average puberty age. It will help to reduce population growth especially reduction in total fertility rate of at least 0.6 children and infant mortality rate to 35 per live birth.
- There should be law and it implementation on the number of children a couple is to born. The Nigeria population policy talks of reducing number of births without placing upper boundary on the number of children a family should have. To achieve a reduction of the national population growth rate identified in the work to 2 percent or lower, the government must stipulate maximum number of children a couple can have and oversee the implementation. And there must be an incentive from the government to those that adhered to the rule as well as Provision of family planning services.
- Provision of employment through functional industrial base and economic growth against poverty. This is because increase in greater opportunities for the population through industrialization is positive drive for economic performance and development. Hence, there should be prioritization of education, jobs and health care through increased expenditure on education and health.

- Serious public enlightenment campaigns should be mounted by government agencies, the mass media, radio, television, chiefs, churches, schools, mosques, home videos, etc. to send across the message of the need and importance of family planning, healthy and improved living conditions for the people through population control.

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INSURANCE-MARKETS EQUILIBRIUM WITH A NON-CONVEX LABOR SUPPLY DECISION, UNOBSERVABLE EFFORT, AND EFFICIENCY WAGES OF THE "NO-SHIRKING" TYPE

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Abstract:

The purpose of this paper is to describe the lottery and insurance-market equilibrium in an economy with non-convex labor supply decision, unobservable effort, and efficiency wages of the no-shirking type a la Shapiro and Stiglitz (1984). The presence of indivisible labor creates a market incompleteness, which requires that an insurance market for (un) employment be put in operation to "complete" the market.

Keywords: indivisible labor, lotteries, unobservable effort, no-shirking, efficiency wages, insurance.

JEL Classification: E10; E22; J41; G22.

Introduction

In this paper we will study the lottery-and insurance-market equilibrium in an economy with non-convex labor supply decision, unobservable effort, and efficiency wages of the no-shirking type a la Shapiro and Stiglitz (1984). We show how lotteries as in Rogerson (1988) can be used to convexify consumption sets. With a discrete labor supply decisions, the markets are incomplete. The particular focus in this paper is on the lottery- and insurance-market equilibrium in an economy with indivisible labor supply, unobservable effort and efficiency wages. The presence of non-convexity requires that an insurance market for employment be put in operation to achieve market completeness.

1. Model Setup

The theoretical setup follows to a great extent Vasilev (2017). There is a unit mass of households, indexed by *i* and distributed uniformly on the [0; 1] interval, as well as a representative firm. In the exposition below, we will use small case letters to denote individual variables and suppress the index *i* to save on notation. To simplify the analysis, the model economy is static, without physical capital, and agents will face a non-convex labor supply decision. The firm produces output using labor and capital, but cannot observe the effort exerted by workers. Given that effort is not directly contractible (due to its unobservability on the firm's side), the firm sets a reservation wage to induce an optimal level of effort.

1.1. Description of the model

Each household maximizes the following utility function:

$$U = \ln c + \eta \ln(1 - eh - \xi), \quad (1)$$

where: $\eta > 0$ is the weight attached to leisure, as in Burnside *et al.* (1993, 1996), and $\xi > 0$ denotes some fixed cost of working.

Parameter $\xi > 0$ is to be interpreted as some kind of organizational or planning cost, *e.g* the time spent on planning how to spend the day productively. Note that if the household decides to supply zero hours of labor, then $\xi = 0$. Variable *c* denotes household *i*'s consumption, *h* denotes hours worked, and *e* is the amount of effort exerted. The time available to each worker is normalized to unity. In addition, we assume that that worker's effort will be imperfectly observable by firms.

All households have equal share in the firm's profit. Total profit is pooled together (within the "family" of households), and then distributed equally among all households. In this way, households can partially insure one another against unfavorable outcomes in the labor market, *e.g.* not being selected for work. The common consumption can be represented as:

$$c^h = \pi = \Pi, \tag{2}$$

or the sum of individual profit income equals firm's total profit. The other type of income is the labor income, and households would differ in each period depending on their employment status.

From the perspective of firms, all individuals are identical, so employment outcome could be viewed as random, *i.e*. the firm will choose a certain share of households for work, and leave the rest unemployed. Since the level of effort is not directly observable by firms, some of the employed workers will work and exert the required effort level, *e*, stipulated in the contract, while others may decide to shirk. If caught, which happens with probability *d* due to the imperfect technology of detection, the individual is fired and receives a fraction $0 < s < 1$ of the wage. As in Burnside *et al.* (2000), the household does not observe whether the others shirked, or were fired, only the initial employment status.

The labor contract that the firms then needs to offer is to be one that induces workers not to cheat in equilibrium. The contract would specify a wage rate, an effort level, and an implementable rule that a worker caught cheating on the job will be fired and paid only a fraction s of the wage, $0 < s < 1$. All workers know this in advance, and take the terms of the contract and the labor demand as given. In general, the supply of labor will exceed labor demand, so in equilibrium there is going to be involuntary unemployment.

In addition, each employed transfers/contributes *T* units of income to the unemployment pool, where the proceeds are used to payout to the unemployed. The level of transfers is such that individuals who are not selected for work by the firm are at least as well off as employed workers who are caught shirking. The consumption of an employed worker who does not decide to shirk then equals:

$$c = c^h + wh - T, \tag{3}$$

where: *w* is the hourly wage rate. Note that an employed worker who decided to shirk, but is not caught, obtains the same consumption as the conscientious worker, but a higher utility of leisure due to the zero effort exerted and thus no fixed cost of work is incurred.

In contrast, a worker who is employed, decides to cheat, and is caught, receives

$$c^s = c^h + swh - T. \tag{4}$$

Alternatively, as proposed in Alexopoulos (2004), this is identical to a case where the firm pays swh upfront, and $(1 - s)wh$ at the end of the period, which is retained in case the worker is caught cheating.

Note that not everyone will be employed, thus the employment rate $\lambda < 1$ and $0 < 1 - \lambda < 1$ would denote the mass of unemployed, a result established in Vasilev (2018). The consumption of unemployed individuals, c^u, is then

$$c^u = c^h + \frac{\lambda}{1-\lambda} T, \tag{5}$$

Where the second term denotes the transfer received by each unemployed. It is straightforward to reformulate the model so that a self-financing unemployment insurance program is provided by the government instead. Therefore, the setup is very close to the one using unemployment lotteries as in Rogerson (1988) and Hansen (1985). Note that if a household is selected for work and rejects the job offer, there will be no unemployment insurance, or it would receive just the common consumption c^h. Therefore, no household selected for work would have an incentive to reject, so the participation constraint will be trivially satisfied.

Depending on whether a household is selected for work or not, the corresponding utility levels are:

$$u(c^u, e^u = 0, h^u = 0) = \ln c^u + \eta ln1 = \ln c^u \tag{6}$$

If unemployed,

$$u(c, e, h) = \ln c + \eta \ln(1 - eh - \xi), \tag{7}$$

If employed and the worker does not shirk,

$$u(c,e,h) = \ln c + \eta ln1 = \ln c, \quad (8)$$

If the person shirks, but is not caught, and

$$u(c^s, e^s = 0, h^s = 0) = \ln c^s + \eta \ln 1 = \ln c^s, \quad (9)$$

If the person shirks, and is caught.

Let λ^s be the proportion of shirkers and given a detection probability d of a shirker being caught, this implies $d\lambda^s$ would be the proportion of shirkers being caught, and $(1-d)\lambda^s$ are the shirkers not being caught. In turn, $\lambda - \lambda^s$ are the employed individuals who decide not to shirk.

Finally, note that the leisure (in efficiency units) of shirkers that are caught, and leisure enjoyed by unemployed individuals is the same. Thus, the lump-sum transfer should be chosen so that the consumption levels of the two groups is equalized, or

$$c^s = c^u \quad (10)$$

$$c^h + swh - T = c^h + \frac{\lambda}{1-\lambda}T \quad (11)$$

Or

$$T = (1-\lambda)swh. \quad (12)$$

In this setup the aggregate household takes as given the effort level and the wage rate $\{e, w\}$, which are specified in the contract that the firm offers. This means that the household takes firm's labor demand as given, which would produce involuntary unemployment. Thus, the household chooses $\{c^h\}$ to maximize (where we have already used the fact that $c^u = c^s$)

$$(\lambda - \lambda^s)[\ln c + \eta \ln(1 - eh - \xi)] + \lambda^s[(1-d)\ln c + dlnc^s] + (1-\lambda)lnc^s \quad (13)$$

s.t.

$$(\lambda - d\lambda^s)c + (d\lambda^s + 1 - \lambda)c^s = (\lambda - d\lambda^s)wh + d\lambda^s swh \quad (14)$$

The first order optimality condition is as follows:

$$c^h: \frac{\lambda - d\lambda^s}{c} + \frac{1 - \lambda + d\lambda^s}{c^s} = \mu, \quad (15)$$

where: μ is the Lagrange multiplier attached to the budget constraint.

1.2. Firm

There is a perfectly competitive representative firm that produces output via the following Cobb-Douglas production function $(H = nh)$

$$y = (He)^{1-\alpha} \quad (16)$$

The firm chooses the employment rate, wage rate (and thus effort level) to maximize

$$\Pi = (He)^{1-\alpha} - wH \quad (17)$$

s.t. "no shirking condition" (the ICC):

$$\ln c + \eta \ln(1 - h - \xi) > (1-d)lnc + dln\, c^s \quad (18)$$

Or

$$dln\, c + \eta \ln(1 - h - \xi) > dln\, c^s \quad (19)$$

In equilibrium, the firm chooses the optimal employment. In addition, the firm offers an efficiency wage w to induce a certain optimal effort level, *i.e. e=e(w)*.

$$n: wh = (1-\alpha)\frac{y}{n} \quad (20)$$

$$w: H = (1-\alpha)\frac{y}{e}e'(w) \quad (21)$$

Dividing the FOC for employment and wages, we obtain

$$\frac{we\prime(w)}{e}=1 \quad (22)$$

Or

$$\frac{w}{e(w)} = (1-\alpha)\frac{y}{H} \quad (23)$$

In other words, this is an equation that characterizes firm's labor demand. Note that the firm minimizes cost per efficiency unit here. Firms want to hire labor as cheaply as possible, and *w/e (w)* is the cost per unit of effective labor. If the firm pays higher efficiency wages to induce more effort, that decreases labor demand (because of the wage premium incorporated in the efficiency wage) and produces involuntary unemployment. Also note that the firm adjusts the extensive margin (employment), while hours per person are not changing.

Next, for a given wage rate, the "no-shirking" condition indicated a maximum effort level the firm can obtain from each worker. Rearranging further the constraint, we obtain

$$e < e(w) = \frac{1-\xi}{h} - \frac{1}{h}(\frac{c^s}{c})\hat{}(\frac{d}{\eta}) \quad (24)$$

The firm takes *T* as given, so the right-hand side is only a function of w, since

$$\frac{c}{c^s} = \frac{c^h+wh-T}{c^h+swh-T} \quad (25)$$

Also

$$e'(w) = -\frac{d}{\eta}(\frac{c}{c^s})\hat{}(\frac{d}{\eta}-1)\frac{c^s-sc}{(c^s)\hat{}2} \quad (26)$$

And

$$w = \frac{c-c^s}{(1-s)h} \quad (27)$$

Since the ratio of consumptions is a function of the wage rate, a result that follows from the Solow condition, the effort equation and the wage expression above. Combining the Solow condition, the effort equation, and the wage expression above, it follows that there is only one value for the consumption ratio that solves the equation and produces a positive level of effort in equilibrium. Thus the ratio of consumptions is constant, and a function of model parameters, *i.e.*

$$\frac{c}{c^s} = \frac{c^h+wh-T}{c^h+swh-T} = \chi > 1 \quad (28)$$

In general, the optimal level of employment will not coincide with the proportion of workers wishing to accept the contract $(w, e(w))$. As long as the firm's demand for labor is less than the labor supply, the "no-shirking" constraint will be binding (hold with equality), and there will be involuntary unemployment.

2. Insurance Market: Stand-in Insurance Company

An alternative way to represent the labor selection arrangement is to regard workers as participants in a lottery with the proportion employed equal to the probability of being selected for work. Therefore, we can introduce insurance markets, and allow households to buy insurance, which would allow them to equalize the actual income received independent of the employment status. More specifically, the structure of the insurance industry is as follows: there is one representative insurance company, which services all households and maximizes profit. It receives revenue if a household is working in the market sector and makes payment if it is not. At the beginning of the period, the households decide if and how much insurance to buy against the probability of being chosen for work. Insurance costs *q* per unit, and provides one unit of income if the household is not employed. Thus, household will also choose the quantity of insurance to purchase *b*; we can think of insurance as bonds that pay out only in case the household is not chosen for work.

The amount of insurance sold by the insurance company is a solution to the following problem: Taking *q (i)* as given, *b (i)* solves

$$\lambda(i)q(i)b(i) - [1-\lambda(i)]b(i) \quad (29)$$

With free entry profits are zero, hence

$$\lambda(i)q(i)b(i) - [1-\lambda(i)]b(i) = 0, \quad (30)$$

Hence the insurance market clears.

3. Decentralized Competitive Equilibrium (DCE) with Lotteries

3.1. Definition

A competitive equilibrium with lotteries is a list

$$(c(i)^w, c(i)^s, e(i)^w, \lambda(i), w, \pi) \tag{31}$$

Such that the following conditions are fulfilled:

(I) Consumer maximization condition: Taking prices w, π as given, for each *i*, the sequence

$$\sigma = (c(i)^w, c(i)^s, e(i)^w, \lambda(i)) \tag{32}$$

Solves the maximization problem

$$(\lambda(i) - \lambda(i)^s)[\ln c(i)^w + \eta \ln(1 - eh - \xi)] + \lambda(i)^s[(1 - d) \ln c(i)^w + d\ln c(i)^s]$$
$$+\big(1 - \lambda(i)\big) \ln c(i)^s \tag{33}$$

s.t.

$$[\lambda(i) - \lambda(i)^s]c(i)^w + [d\lambda(i)^s + 1 - \lambda(i)]c(i)^s = (\lambda(i) - d\lambda(i)^s)wh + d\lambda(i)^s swh \tag{34}$$

With

$$c(i)^w > 0, c(i)^s > 0, 0 < \lambda(i) < 1, \lambda(i)^s < \lambda(i) \tag{35}$$

(II) Firm maximization condition: Taking prices w, π as given, maximize

$$\Pi = (He)^{1-\alpha} - wH \tag{36}$$

s.t. "no shirking condition" (the ICC):

$$\ln c + \eta \ln(1 - h - \xi) > (1 - d)lnc + d\ln c^s \tag{37}$$

(III) Market-clearing conditions:

$$h \int_i \lambda(i)di = H \tag{38}$$

$$\int_i \{[\lambda(i) - d\lambda(i)^s]c(i)^w + (d\lambda(i) + 1 - \lambda(i))c(i)^s\}di = (He)^{1-\alpha} \tag{39}$$

Where the first equation describes the clearing in the labor market, while the second equation captures the goods-market clearing.

3.2. Characterization of the DCE

The household's problem is as follows:

$$L = (\lambda(i) - \lambda(i)^s)[\ln c(i)^w + \eta \ln(1 - eh - \xi)] + \lambda(i)^s[(1 - d) \ln c(i)^w + d\ln c(i)^s]$$
$$+\big(1 - \lambda(i)\big) \ln c(i)^s$$
$$-\mu\{[\lambda(i) - \lambda(i)^s]c(i)^w + [d\lambda(i)^s + 1 - \lambda(i)]c(i)^s - (\lambda(i) - d\lambda(i)^s)wh - d\lambda(i)^s swh\} \tag{40}$$

where: μ is the Lagrange multiplier attached to the household's budget constraint. The first-order optimality conditions are as follows:

$$c(i)^w : \frac{1}{c(i)^w} = \mu \tag{41}$$

$$c(i)^s : \frac{d\lambda^s}{c(i)^s} = \mu(d\lambda^s + 1 - \lambda) \tag{42}$$

It follows that

$$\frac{c^w}{c^s} = 1 + \frac{1-\lambda}{d\lambda^s} \neq \chi \tag{43}$$

Notice that since it cannot be that $c(i)^s = 0$, it follows that $\lambda(i)^s = 0$. That is, in equilibrium nobody will be shirking (and thus taking a first-order condition with respect to λ^s makes no sense). Next, we simplify the Lagrangian by suppressing all consumption superscripts and *i* notation in the derivations to follow:

$$\lambda: \ln\left(\frac{c^w}{c^s}\right)(1-eh-\xi)^{\eta} = \mu[c^w - c^s - wh] \quad (44)$$

This condition states that the marginal rate of substitution between effort in the market sector and consumption equals the wage rate. This implicitly characterizes optimal market sector participation rate λ. Note that it is optimal from the benevolent planner/government point of view to choose randomly λ and introduce uncertaintly. With randomization, choice sets are convexified, and thus market completeness is achieved. Now we extend the commodity space to include insurance markets explicitly.

4. Decentralized Competitive Equilibrium (DCE) with Lotteries and Insurance Markets

4.1. Definition

A competitive equilibrium with lotteries and insurance markets is a list

$$(c(i)^w, c(i)^s, e(i)^w, \lambda(i), w, \pi, b(i), q(i), p) \quad (45)$$

Such that the following conditions are fulfilled:

(I) Consumer maximization condition: Taking prices w, π, p as given, for each *i*, the sequence

$$\sigma = (c(i)^w, c(i)^s, e(i)^w, \lambda(i), b(i), q(i)) \quad (46)$$

Solves the maximization problem

$$(\lambda(i) - \lambda(i)^s)[\ln c(i)^w + \eta \ln(1-eh-\xi)] + \lambda(i)^s[(1-d)\ln c(i)^w + dln\, c(i)^s] + \big(1-\lambda(i)\big)\ln c(i)^s \quad (47)$$

s.t.

$$pc(i)^w + b(i)q(i) = wh + \pi \quad (48)$$

$$pc(i)^s = b(i) + \pi \quad (49)$$

With

$$c(i)^w > 0, c(i)^s > 0, 0 < \lambda(i) < 1, \lambda(i)^s < \lambda(i) \quad (50)$$

Or

$$pc(i)^w + pq(i)c(i)^s = wh + (1+\pi)q(i) \quad (51)$$

(II) Firm maximization condition: Taking prices w, π as given, maximize

$$\Pi = (He)^{1-\alpha} - wH \quad (52)$$

s.t. "no shirking condition" (the ICC):

$$\ln c + \eta \ln(1-h-\xi) > (1-d)lnc + dln\, c^s \quad (53)$$

(III) Insurance-company condition: Taking *q(i)* as given, *b(i)* solves

$$\lambda(i)q(i)b(i) - [1-\lambda(i)]b(i) \quad (54)$$

With free entry profits are zero, hence

$$\lambda(i)q(i)b(i) - [1-\lambda(i)]b(i) = 0, \quad (55)$$

Hence the insurance market clears.

(IV) Market-clearing conditions:

$$h\int_i \lambda(i)di = H \quad (56)$$

$$\int_i \{[\lambda(i) - d\lambda(i)^s]c(i)^w + (d\lambda(i) + 1 - \lambda(i))c(i)^s\}di = (He)^{1-\alpha} \quad (57)$$

Where the first equation describes the clearing in the labor market, while the second equation captures the goods-market clearing.

4.2. Characterization of the DCE

The household's problem is as follows:

$$L = (\lambda(i) - \lambda(i)^s)[\ln c(i)^w + \eta \ln(1 - eh - \xi)] + \lambda(i)^s[(1 - d)\ln c(i)^w + dln\, c(i)^s]$$

$$+\big(1 - \lambda(i)\big)\ln c(i)^s - \mu[pc(i)^w + pq(i)c(i)^s - wh - (1 + \pi)q(i)] \quad (58)$$

Without loss of generality, normalize p=1. We also obtained that $\lambda^s(i) = 0$, for all i. The resulting first-order conditions are as follows:

$$c^w(i): \frac{\lambda(i)}{c^w(i)} = p\mu \quad (59)$$

$$c^s(i) = \frac{1-\lambda(i)}{c^s(i)} = pq(i)\mu \quad (60)$$

Optimal $\lambda(\lambda(i) = \lambda)$ is implicitly characterized by the zero-profit condition from the insurance company:

$$\frac{\lambda}{1-\lambda} = \frac{1}{q}, \quad (61)$$

which implies that the price of the insurance equals the ratio of probabilities of the two events ("the odds ratio"). Combining this with the other optimality condition, we obtain that conditional on an efficiency wage schedule that discourages shirking, households buy full insurance to equalize consumption,

$$c^w = c^s, \quad (62)$$

for all *i*. That is, in the presence of uncertainty, we need an insurance companie to achieve market completeness.

Conclusions

This paper describes the lottery- and insurance-market equilibrium in an economy with non-convex labor supply decision, unobservable effort, and efficiency wages of the no-shirking type a la Shapiro and Stiglitz (1984). The presence of indivisible labor creates a market incompleteness, which requires that an insurance market for (un) employment be put in operation to "complete" the market.

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THE IMPLICATIONS OF REGIONAL COMPETITIVENESS ON REGIONAL DEVELOPMENT POLICY AND ECONOMIC COHESION

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Abstract:

Starting from the calculation pattern of the regional competitiveness in Romania, proposed by GEA in 2007, we proposed to draft a hard matrix where we could draft a comparative analysis of the evolution of the competitiveness of the regions in Romania regarding the values registers in 2017 as opposed to 2007. The research presented takes into consideration the available regional indicators on the level of Romania as well as: the GDP per capita, the growth rate of the gross added value, the share of the gross GDP, the employment rate, the index of the life expectancy, the population with the risk of poverty or social exclusion, research-development expenses in GSP, employees in research-development from the total employed population, tertiary education in research-development, innovative enterprises in total enterprises and so on. We also selected a linear pattern based on 3 factors according to which the regional competitiveness will be analysed that is the economic factors, the social factor and the technologic factor. The data used were collected from the existing database on the level of the national Statistics Institute and on the international Eurostat level.

Keywords: competitiveness, economic cohesion, regionalisation, regional indicators.

JEL Classification: R11; R58; C43.

Introduction

In order to investigate the competitive position of the regions in Romania we start from the methodology proposed by the Group of Applied Economics in two studies carried out by them, the first elaborated in 2007 entitles *Manual for the Evaluation of Regional Competitiveness*, and the second study published in 2010 entitled *Reindustrialisation of Romania*: Policies and Strategies, study proposed by the Ministry of Economics, Commerce and Business Environment.

Starting from this methodology we built an indicator which we consider more adapted to the development particularities of the regions in Romania. We built this indicator selecting criteria which could allow the relevance of the information based on the available date in the national and European statistics. In order to build this multi-criteria indicator of the economic development of the region in Romania, we went through the following steps:

- 1st stage. We selected the researched period so that the result of the analysis should reflect the level of the existing disparities before joining the European Union (respectively in 2007) and might show the evolution of the development regions up to the present, respectively in 2017, pointing out the impact of the regional policies and of the regional governance brought by the EU accession;

- 2nd stage. Although the theoretical and the empirical studies carried out a series of indices appreciating competitiveness of a region, we also must identify the answer to a series of questions, as follows:

- Which are the determiners of regional development?
- Which are the optimum indicators in order to identify the level of regional development?
- To what extent the existence of the data makes pertinent the regional analysis in comparable terms?

Starting from this research hypothesis we chose the economic, social and technologic indicators making the object of this research where we could point out the size of the disparities among the regions and we will generate a hierarchy territorial unit. For the beginning we identified the significant indicators from the perspective of the more complex characterisation of the regional disparities. Our option for the chosen indicators was based on the desire to surprise varied faces of the degree of economic, social and technologic development, but it was limited by the available date on a regional level in the official statistics. Therefore, we decided to use 13 indicators selected based on the relevance and the availability of the official data, avoiding the redundancies at the same time.

- 3th stage. We will carry out a hard matrix based on the three pillars that is: economic, social and technologic. The assessment patters determined us to select a set of indicators for the three pillars, which are: economic, social and technological. The evaluation model determined us to select a set of indicators for the three pillars, by calculating an average share, in an index of regional competitiveness in order to capture a clearer image of the immediate reality in a realistic way.

1. Construction of the Regional Indicator of Competitiveness

The proposed indicators for the analysis we selected based on the high relevance for the regional development and for the growth of the economic competitiveness as we presented it in Table no.1.

The economic aggregate index has a share of 40% from the Indicator of Regional Competitiveness, and the share of each component (according to table no.5.18) are: *GDP per capita, -20%, the rate of growth of the gross added value, - 10% of the labour productivity, -30% of the gross fixed capital formation (% from GDP), -20% respectively the income of the households – 20%.*

Table 1. Construction of the pattern of the three factors forming the Regional Indicator of Competitiveness (IRC)

Index		Share
Economic index (Ei)		**40%from IRC**
	E_1 GDP/capita	20%
	E_2 Rate of growth of the gross added value	10%
	E_3 Labour productivity	30%
	E_4 Gross fixed capital formation (% from GDP)	20%
	E_5 Household income	20%
Economic Index = 20%* E_1+10%* E_2+30% *E_3+20%* E_4+20%* E_5		
Social index (Si)		**30%from ICR**
	S_1 Employment rate (total)	40%
	S_2 Employment rate (women)	20%
	S_3 Index of the average life expectancy	20%
	S_4 Population under risk of poverty and social exclusion	20%
Social index = 40%*S_1+20%* S_2+20%* S_3+20%* S_4		
Technologic index (Ti)		**30%from ICR**
	T1 C&D expenses (percentage from GDP)	40%
	T_2 Employees in research development from total employed	20%
	T_3 Tertiary education specialised in advanced research	20%
	T_4 Innovative enterprises in total enterprises	20%
Technology index - 40%* T_1+20%* T_2 +20%* T_3+20%* T_4		
Regional competitiveness strategy = 40%*Ei+30%*Si+30%*Ti		

Source: built by the author based on the methodology proposed by GEA, 2007

The social aggregate index represents 30% of the Regional Competitiveness Index while the shares of the four sub-indicators taken into consideration are: 40% *for the employment rate*, 10% *for the feminine employment rate*, 20% *for the average life expectancy*. Similarly, with the economic index, and as in the case of the social index we notice the lack of a sub-indicator among those proposed by the GEA model, that is the dispersion of the regional employment rates. At the same time, we noticed relevant the insertion of the indicator regarding the *population under the risk of poverty or social exclusions*, in order to prove the disparities between regions.

The social aggregate index represents 30% from the Regional Competitiveness Indicator, while the shares of the four sub-indicators which were taken into consideration are: 40% for the employment rate, 10% for the feminine employment rate, 20% for the average living standard. Similar

As for the technology index, this represents 30% of the Regional Competitiveness Index, and the distribution

of the shares among its components are: *C & D (percentage from GDP)* represents 40%, *the employees in research* development from total employed population as well as the higher specialised education in advanced research have a share of 20% each, adding to this an indicator which we thought it was relevant, respectively innovative enterprises *as a share in the total enterprises*.

- Stage 4. In what follows we will calculate each index, by normalising the regional statistics in relation to their national average. Therefore, the national average shall be 1.00 (100%), and the regional indices will vary around this value (if it registers an over unity value it means that it is higher than the national average while a sub-unitary value means that it is below the national average).
- Stage 5. At the end, each index will be aggregated by sharing the composite sub-indicator with the presented shares under table 1.
- Stage 6. Determining the regional competitiveness indicators in Romania in 2007 and 2017 and drafting a final classification of the regions.

2. Comparative Analysis of the Economic, Social and Technologic Indicators of the Regional Competitiveness in Romania

The aggregate economic index (Ei), is calculated considering the shares within the research methodology and offers a classification of the regions from the point of view of the economic performance. This criterion cannot be exclusive because there are situations where a region should be placed on a higher position, but its position can be prejudiced by the lack of correlation with the social and the technological indices.

The aggregate economic index calculated point out the classification of the regions in Romania regarding the economic factors which are relevant:

- *GDP per capita* – because reporting GDP to the number of inhabitants shows the living standard in a certain region. This indicator is easy to calculate facilitating the comparison between the living standard from various regions.
- *The growth rate of the gross added value* – the gross added value expresses the excess of goods and services above the value of goods and services for production pointing out the newly created value in the production process.
- *Labour productivity*– measures the efficiency of the human capital in obtaining the regional GDP. Based on this indicator we assess the competitiveness of a region as compared to other regions by appreciating the efficiency of the human resources in reaching the regional GDP. Due to the (statistical) disparities in Romania (and not only), in measuring the number of worked hours allowing a comparison among regions, the calculation of work productivity was carried out by reporting the regional GDP to the total number of employees in a region. The (available) data used are for the years 2008 and 2016.
- *Gross capital formation* (% from GDP) – the higher the ration between fixed gross capital formation and GDP, the more attractive is that region for investments. A higher level of investments leads, on a long and medium term, to a growth of the regional economy and subsequently of the living standard. The outcomes of this indicator as compared to those on the regional level should be interpreted carefully because the economic activity in various regions can be specialised on various sectors of economics, with various degrees of using the fixed capital in the productive process. Therefore, the services sector, generally has a lower rate of the fixed capital formation in GDP as compared to the sector of industrial production.
- *Household income* - includes: money income on sources of origin (salaries, incomes from activities, sales, unemployment aids, pensions, child allowances, scholarships and other social protection benefits, incomes from properties etc.); counterpart for the consumption of food and non-food products (production, stock etc.), determined based on average monthly prices of those products.

Table 2. Economic aggregate index – regional comparison on the level of the years 2007 and 2017

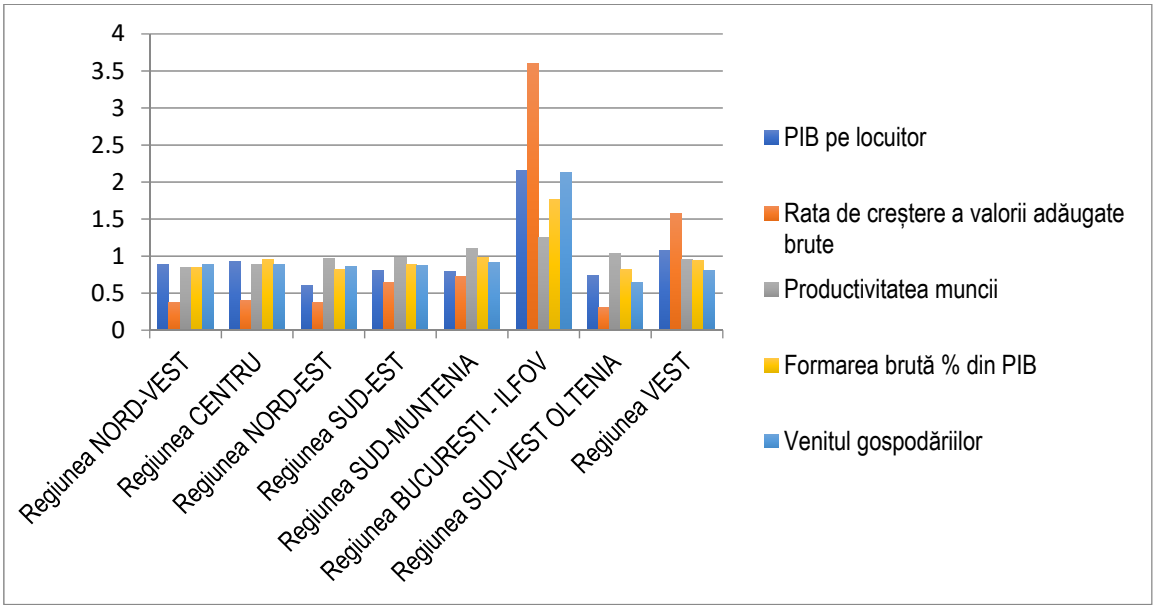
Region	2007	Place	2017	Place	Variation
Region NORTH-WEST	0,817979269	6	1,056051752	2	1,291049532
Region CENTER	0,861560169	5	1,003572402	4	1,164831475
Region NORTH-EAST	0,78302364	7	0,69232205	7	0,884164941
Region SOUTH-EAST	0,871495945	4	0,808258689	5	0,927438267
Region SOUTH-MUNTENIA	0,942059797	3	0,852288102	6	0,90470701
Region BUCHAREST - ILFOV	1,947096491	1	1,906248913	1	0,979021287
Region SOUTH WEST OLTENIA	0,778939952	8	0,657862287	8	0,844560977
Region WEST	1,006755372	2	1,034518785	3	1,02757712

Source: Calculated based on the data INSSE Tempo Online and Eurostat: nama_10r_2gvagr, nama_10r_2gdp, nama_10r_2gfcf, nama_10r_2hhinc

According to these calculated indices, the region Bucharest-Ilfov is situated on the first place, even after summing up the economic indicators. This is, because the region Bucharest-Ilfov is the region with the capital city. It can also be noticed for Romania and for the other EU Member States, the cental-periphery effect, that is the regions including the capital or around the capital are more developed and more competitive than the others.

The region Bucharest-Ilfov is followed by a contingent of seven other relatively homogenous regions, where the economic competitiveness disparities are not that high. The Center Region which was on the second place in the regional classification for many years reaches the 5th place in 2007 and the 4th place in 2017 while the Region North West experiences a special revival with the highest positive variation in the analysed period that is 1,29%. Although it registers a similar GDP per capita in the analysed period, it is the second region in 2017, registering significant labour productivity growth (from 0,84 normal value to 0,95 in 2017) and of the rate of growth of the gross added value (from 0,38 to 1,84 in 2017).

Figure 1. Aggregate economic index – regional comparison on the level of the year 2007



Source: Calculated based on the data INSSE Tempo Online and Eurostat: nama_10r_2gvagr, nama_10r_2gdp, nama_10r_2gfcf, nama_10r_2hhinc

In the entire Southern region (three regions), the regions register a lower regional economic competitiveness index, and the region South West registers the lowest level of the regional economic competitiveness. As compared to the year 2007, in 2017 we notice an improvement of the situation not only in the regions North West and Center but also the other positions remain unchanged. Even if the classification did not change a lot, we notice that there are three regions where an important variation was noticed in the analysed period that is the region North West with 29%, the region Center with 16% and the region West with 2,7%.

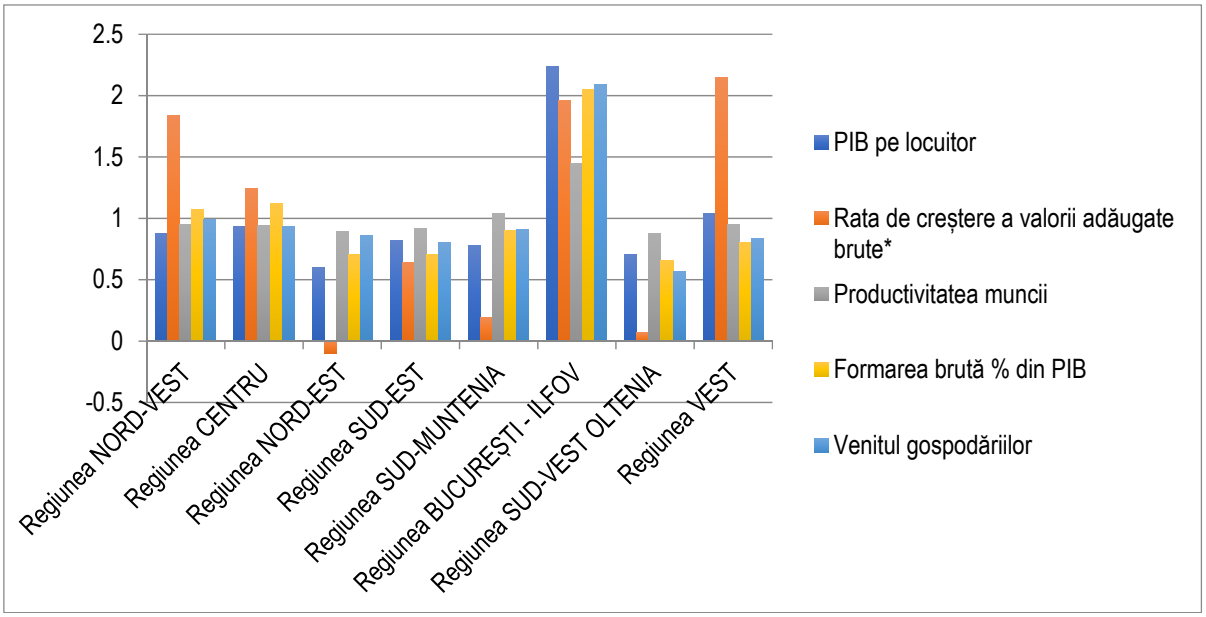
We might conclude that while the disparities between the region with the capital of Romania, that is Bucharest-Ilfov and the other regions with dynamic urban centres, that are North West and West seem to alleviate, the other regions don't have a similar evolution. The disparities in terms of economic competitiveness between the West and the East are still high, because the regions from the South and the East of the country go down in terms of competitiveness while the Western regions (except for the South-Western region) go up. On a national level, comparing the evolution in the period between 2007-2017 we notice the fact that we are confronting with a trend of regional economic convergence.

A second set of indicators which we took into consideration in appreciating the regional competitiveness are *the social indicators (Si).* These maintain a balanced approach regarding the existing situation on the field which might be disproportionate when the economic indicators are analysed.

The calculated social indicator points out the classification of the regions in Romania regarding the social factors appreciated by us as being relevant:

- *Occupation rate* – representing the employed and the unemployed population aged 15-64 years, being expressed in percentages. The employed population includes all people of 15 and above carrying out an economic activity producing goods and services for at least one hour in the analysed period, in order to make income under the form of a salary, payment in nature or other benefits. Increasing the employment rate represents in any conditions a positive evolution. The economic activity is enhanced by a better use of the production factor "labour".

Figure 2. Aggregate economic index – regional comparison on the level of year 2017



Source: Calculated based on the data INSSE Tempo Online și Eurostat: nama_10r_2gvagr, nama_10r_2gdp, nama_10r_2gfcf, nama_10r_2hhinc

- *The feminine employment rate* – The macroeconomic analysis points out that the reform process or the economic growth process has different effects on the various social categories, so that some groups – for example ethnic minorities, mono-parental families, unemployed, pensioners – are negatively affected more than others. From the total of the employed population, the feminine workforce is distinctly analysed due to the significance it has in the productive process: on one hand, it is about the capacity of women to contribute under equal conditions to create value; on the other hand it is about the capacity of women to contribute under equal conditions to create value; on the other hand the labour market has a series of deficiencies (as for example: discriminative attitudes, reduced diversification of the employment, traditions, social assistance) which do not favour using on a wide scale the feminine contingent within the economic activities. For these reasons, a growth of the feminine employment rate represents a more favourable evolution.
- *The index of the average life expenctancy* – shows the relative performance of a region as for the life expectancy at birth. It is reported to the maximum and minimum levels registered in the (national) reference environment. The life expectancy represents an indicator of the life quality. We cannot appreciate a region as being competitive in the situation where people have a low living standard. We cannot asses a region as being competitive if people have a low living standard. The human resource is essential in providing the competitiveness of a company and by extrapolating a region. The life expectancy synthesizes the quality of the environment, the quality of the social services, the level and the influence of the stress factors (GEA, 2007).
- *The population under risk of poverty or social exclusion* - indicator appreciating both the distribution of incomes, the rate of relative poverty and (i) the access to basic goods and services, by the rate of high material deprivation and (ii) the access to income on the labor market, by means of the indicator regarding the very low labour intensity (time for labour from the total available time of the active people from the household). For this indicator pointing out a better situation with low values (as this one is) we used a different normalisation formula:

$$I_n^m = \frac{X_{\max}^m - X_n^m}{X_{\max}^m - X_{\min}^m} \quad (1)$$

where: X_n^m is the value of the m indicator for the region, and $X_{\min}^m$ și $X_{\max}^m$ represents the minimum value, respectively the maximum value of the m indicator.

We thought that these changes of the initial values are necessary in order to be able to make a unitary assessment which should not rely on the nature of the partial indicators or on their different measurement units. By means of this normalisation the region wit the highest territorial performance for a certain indicator will register the value 1, while the region with the lowest performance will have the standardised value 0.

The four investigated indicators refer to the employment both on a global level, to the feminine employment, to the average of the living standard and the population under risk of poverty or social exclusions as indicators of the living standard. In this way it was created the Social aggregate index, detailed in table no.3 where we carried out a classification of the development regions in Romania between 2007 and 2017.

As it was pointed out in Table no.3, although it was placed on the last place from an economic point of view, the region South West tries to compensate, being placed on the sixth place from a social point of view. The last place in this classification is held by the North Eastern Region which maintains the indicators constant during the analysed period, without registering any improvement.

Table 3. Social aggregate index – regional comparison on the level of the years 2007 and 2014

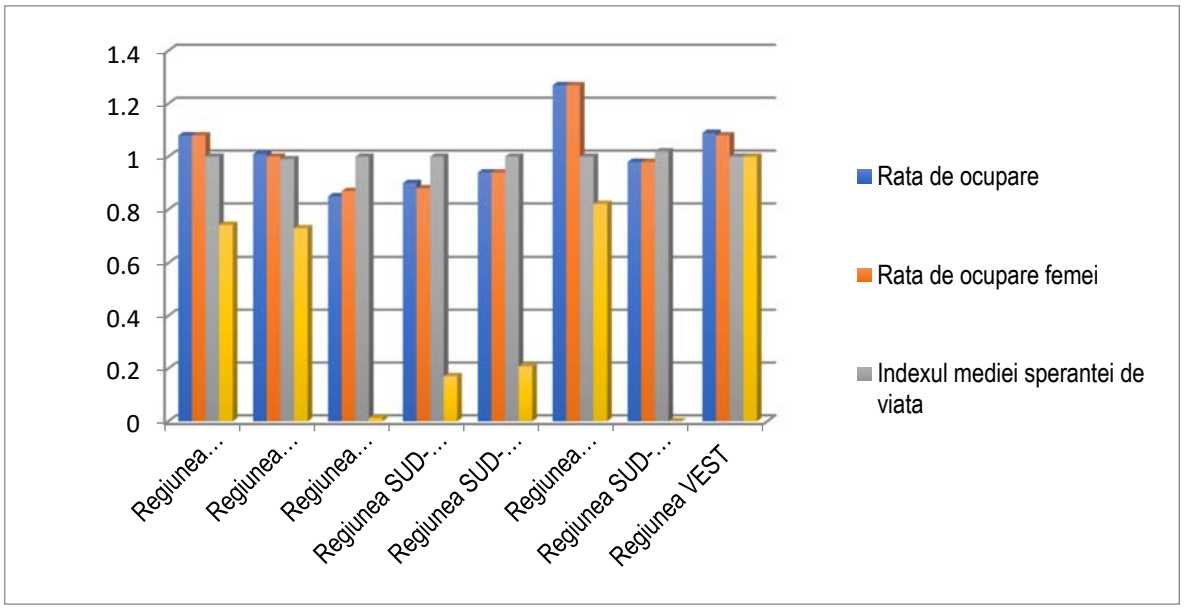
Region	2007	Place	2017	Place	Variation
Region NORTH-WEST	0,99681948	3	1,019355456	2	1,022607881
Region CENTER	0,946625158	4	1,01557622	3	1,072838822
Region NORTH EAST	0,717532848	8	0,720646903	8	1,004339947
Region SOUTH EAST	0,772022679	7	0,782841266	5	1,014013303
Region SOUTH MUNTENIA	0,804513681	5	0,773243919	6	0,961132095
Region BUCHAREST-ILFOV	1,124623316	1	1,19414469	1	1,061817475
Region SOUTH WEST OLTENIA	0,792744969	6	0,76124027	7	0,960258721
Region WEST	1,052224685	2	0,955478385	4	0,908055475

Source: Calculated based on the data INSSE Tempo Online și Eurostat: lfst_r_lfe2emprt, demo_r_mlifexp, ilc_li41

The region Bucharest-Ilfov is placed again on the first place while the region west lost competitiveness. The progress indicator is balanced in the eight development regions, so that in three of the regions, they improved their position in 2017 as opposed to 2007 (North-West, Centre and South East), three registered a decrease of social competitiveness (South-West, West and South Muntenia) and two maintain their place (the first, Bucharest Ilfov and the last North East).

As for the social factor, we cannot notice the same pattern centre-periphery, as in the case of the economic factor. The index reveals a paradox, that is the less developed regions are placed on the last places from the point of view of the social welfare. We notice that the risk of poverty or social exclusion considerably decreased in all regions, more in the North-Western Regions by 32% in 2017 as opposed to 2007 and Centre with 34%. Based on the migration, the employment rate and the feminine employment rate decreased in South West and South Muntenia.

Figure 3. Social aggregate index – regional comparison on the level of the year 2007

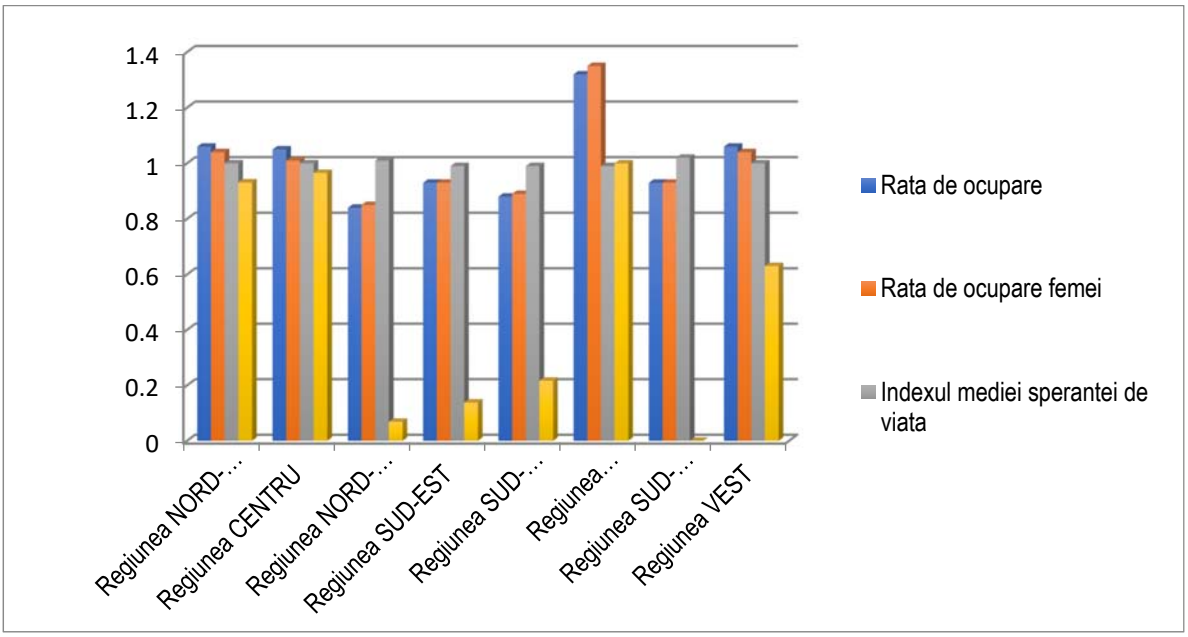


Source: Tempo Online și Eurostat: lfst_r_lfe2emprt, demo_r_mlifexp, ilc_li41

The South West region is on the last place regarding the economic performance and on the seventh place regarding social welfare. At the same time, the North-Eastern region is on the next to last place regarding economic performance and on the last place regarding the social welfare. This phenomenon shows us that these are the main regions which should benefit from support through the regional EU policy and the macroeconomic policy in

Romania, their situation being very weak along the analysed period.

Figure 4. Social aggregate index – regional comparison on the level of the year 2017



Source: Calculated based on the data INSSE Tempo Online și Eurostat: lfst_r_lfe2emprt, demo_r_mlifexp, ilc_li41

The last set of indicators is the one of high technologies and innovation (Ti) as a form of evaluation of the competitive development potential in the analysed regions. In this sense, the evolution is modelled in 2007 as compared to 2017 on a regional level taking into account aspects as financial involvement in the field of research and development (expenses for this field, as a percentage from the GDP of the region), the number of employees in fields related to research and development-innovation and graduates in the tertiary education in this field.

The technology index will take into consideration:

- R & D (percentage from GDP) – The Research and development expenses consist of expenses made by the central and public administration, by the private environment and by the academic environment, with the research and development, the creative work accomplished on a systematic base with the purpose of increasing the knowledge stock and to use this knowledge in order to develop new applications. It shows the development potential of the knowledge-based economy. Moreover, the discrepancy among regions in Romania is higher than this indicator. We chose this indicator because it expresses the context for research-development. For example, the public expenses, even if they are high, they can be very inefficient, and they cannot express a competitive potential.
- The research-development employees from the total employed population – point out the intensity of an economy in creating technology; this indicator related the labour market to competitiveness. The indicator points out both the capacity of an economy to produce high quality goods and services but also the capacity to offer jobs in these sectors. It is calculated as a percentage in the employed population. The higher the percentage, the higher the competitiveness.
- The higher education specialised in advanced research – It is an indicator of tertiary education adequate for the research-development objective. It is an education indicator but also a technological one. The existence of the qualified human capital represents an important aspect of competitiveness. It is calculated as a share of the students with high specialisation in research from the total number of students.
- Innovative enterprises as a share in total enterprises – are the enterprises launching new products or significantly improved products. The concept covers product innovators, process as well as enterprises with unfinalized innovations and refer to active enterprises.

The aggregate situation presented in Table 4 reveals the regions with the highest growth potential of competitiveness from a technological point of view. We also notice the fact that the difference between Bucharest-Ilfov and the other regions is even higher.

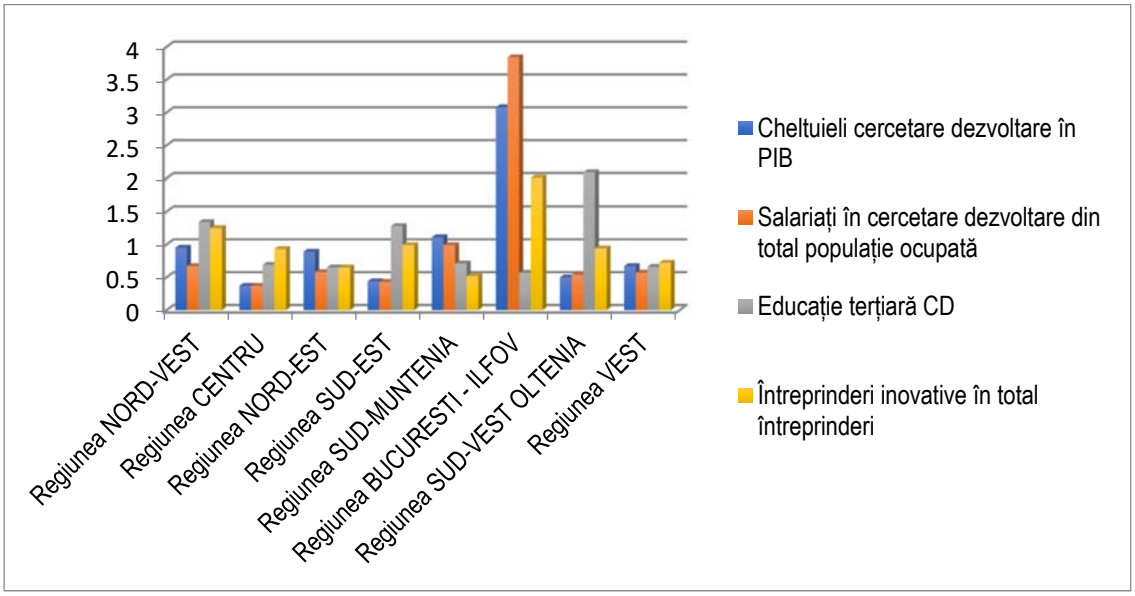
The second region from the point of view of the regional technological competitiveness index is the West region registering a significant growth in the analysed period from the 7th place to the second place but even so it registers a value of the index of less than a half from the index registered in the region which was on the 1st place, Bucharest.

Table 4. Aggregate technology index – regional comparison on the level of the years 2007 and 2017

Region	2007	Place	2017	Place	Variation
Region NORTH-WEST	1,033298626	2	0,955752664	3	0,924953001
Region CENTER	0,546468767	8	0,717082943	6	1,312212126
Region NORTH EAST	0,735127187	5	0,526475804	8	0,716169682
Region SOUTH EAST	0,71654206	6	0,652390948	7	0,910471254
Region SOUTH MUNTENIA	0,8862258	4	0,755387312	5	0,852364388
Region BUCHAREST-ILFOV	2,51468776	1	2,566156251	1	1,02046715
Region SOUTH WEST OLTENIA	0,914514524	3	0,879380367	4	0,961581631
Region WEST	0,657202915	7	0,955301729	2	1,453587176

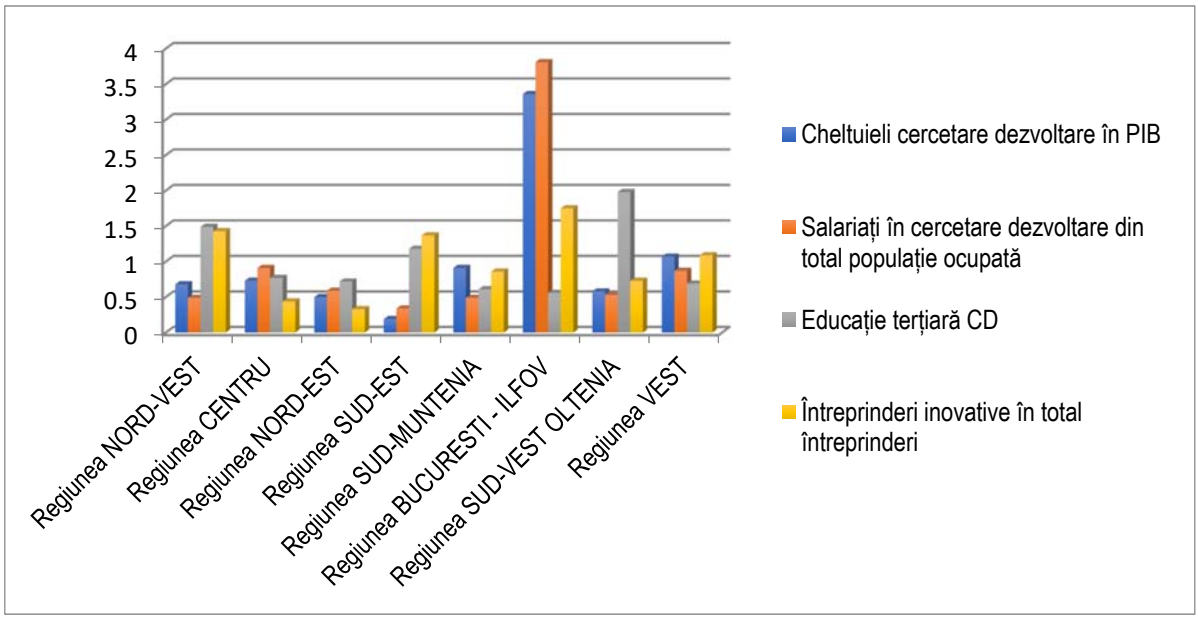
Source: Calculated based on the data INSSE Tempo Online and Eurostat: htec_emp_reg2, hrst_st_rcat

Figure 5. Aggregate technology index – regional comparison on the level of year 2017



Source: Calculated based on the data INSSE Tempo Online și Eurostat: htec_emp_reg2, hrst_st_rcat

Figure 6. Technology aggregate index – regional comparison on the level of the year 2007



Source: Calculated based on the data INSSE Tempo Online and Eurostat: htec_emp_reg2, hrst_st_rcat

The third region regarding the technologic development is the North West region followed on the fourth place by the South West region. Although the region Bucharest Ilfov is in front of the other regions regarding the expenses

with research-development, for the employees from this field and the innovative enterprises, the number of students from this sector decreases being behind region South West Oltenia.

This aspect explains the internal migration of the specialists towards richer regions, after they graduate their studies in poor regions. The highest number of higher education students are in the regions South-West, North-West and South-East. If in the last two ones there was also an increase in the innovative enterprises in the total of enterprises between 2007 and 2017 in the region South Oltenia, the share of innovative enterprises went down.

The regions situated in the Eastern part of the country are less developed from a technological point of view, occupying the last places in the classification as follows: region North East on the eighth place, region South East on the seventh place and region Centre on the sixth place.

The regions experiencing a growth of the Technology Index in the analysed years are the region Center, West and Bucharest-Ilfov. The highest growth was registered in the region west while the highest decrease of the technology index was registered by the region North East.

3. Classification of the Development Regions in Romania According to the Regional Competitiveness Index

As we mentioned previously, an analysis reuniting the 3 balanced indices brings a holistic approach, a better understanding of the factors influencing regional competitiveness. The competitiveness index secures a classification of the competitiveness of the regions from all three points of view. The distribution index is represented in Tables 5 and 6.

As we expected, the region Bucharest-Ilfov is the most competitive one in 2007, but also in 2017, and it is expected to maintain its position in the next years especially due to the labour productivity contact and sustained investments in research and development. In spite of these, the general tendency is to lose the advance towards the competitiveness in front of the other regions which are way behind and which are hardly trying to recover the disparities towards the region Bucharest-Ilfov. Therefore, from an economic point of view, in the analysed period the disparities between the region North West and Centre were solved and from a technologic point of view the disparity between West and Centre.

Table 5. The index of regional competitiveness in Romania in 2007

Region	IEC 2007	Balance coefficient	ISC	Balance coefficient	ITC	Balance coefficient	Competitiveness index	Place
Region NORD-VEST	0,82	0,4	0,88	0,3	1,03	0,3	0,90	2
Region CENTRU	0,86		0,83		0,55		0,76	7
Region NORD-EST	0,78		0,67		0,74		0,73	8
Region SUD-EST	0,87		0,71		0,72		0,78	6
Region SUD-MUNTENIA	0,94		0,74		0,89		0,86	4
Region BUCURESTI – ILFOV	1,95		1,00		2,51		1,83	1
Region SUD-VEST OLTENIA	0,78		0,74		0,91		0,81	5
Region VEST	1,01		0,91		0,66		0,87	3

Source: calculated by the author based on the indices from Tables 2, 3 end 4

Table 6. The index of regional competitiveness in Romania in 2017

Region	IEC 2017	Balance coefficient	ISC	Balance coefficient	ITC	Balance coefficient	Competitiveness index	Place
Region NORD-VEST	1,06	0,4	0,88	0,3	0,96	0,3	0,97	2
Region CENTRU	1,00		0,88		0,72		0,88	4
Region NORD-EST	0,69		0,66		0,53		0,63	8
Region SUD-EST	0,81		0,71		0,65		0,73	7
Region SUD-MUNTENIA	0,85		0,70		0,76		0,78	5
Region BUCURESTI – ILFOV	1,91		1,05		2,57		1,85	1
Region SUD-VEST OLTENIA	0,66		0,70		0,88		0,74	6
Region VEST	1,03		0,85		0,96		0,95	3

Source: calculated by the author based on Tables 2, 3 and 4

In 2007, as well as in 2017, the second region from the point of view of the competitiveness is the region North West benefiting from urban poles with a fast growth. There are some regions which managed to register a higher competitiveness index and to overcome other regions in the analysed years or which kept their place in the classification. It is also the case of the Centre region which managed to migrate from the 7th place in 2007 up to the 4th place in 2017 while the regions Bucharest Ilfov, North West and West maintain their places in the top of the classification for the whole period. The other regions of Romania lost their positions in the analysed period.

In spite of these, we consider that in order to lower the disparity among regions, there are measures which can be taken by regional authorities in order to facilitate and to encourage the regional development: the growth of research and development investments and the stimulation of localising foreign companies in the province regions by offering tax reductions, the possibility to lease land for lower prices etc. We also notice the fact that the North-Eastern region is the most deficitary region in terms of competitiveness that is why we must take measures in order to grow competitiveness on a long term. The Southern part of the country is affected by the economic-social and technological change due to the transformation of the structure of the economic sectors from the agricultural industry to the knowledge-based economy.

Conclusion

The comparative analysis of the position of the regions and the evolution of the regional competitiveness from Romania, taking into consideration the economic indicator and the regional competitiveness indicator, we notice two aspects: in both cases the region Bucharest Ilfov is on the first place, but the difference between the two approaches is economic and the second containing both social and technological indicators, appearing when the region of the capital separates from the other seven regions. The reason for which the region Bucharest Ilfov is situated on the first place due to the fact that being the region with capital it manages easier to draw foreign direct investments, because the capital has all the embassies and the consulates, transforming the region in the most attractive location for the foreign investors. At the same time, it benefits from fast access to the best-known international airport in Romania, the Otopeni Airport, and the distance to the port Constanta is very little.

The transition process proves to be extremely difficult taking into account that on one hand, the opening market and on the other hand the labour force have the tendency to move to the capital, because it provides a higher level of welfare both from an economic point of view but also from a technologic point of view. Despite these, the population in this area does not benefit from a high level of social welfare, so that we identify the risk of migration of the population towards the capital and more probably towards other EU member states.

Another identified trend within the elaborated study is the fact that the regional competitiveness index registers higher values from the Western part of the country, especially regarding indicators as for example employment, industrial production, incomes and revenues, while in the Eastern part of the country the regional competitiveness level is lower. We also identify a pattern of the type centre-periphery of the regional competitiveness, the central regions being more competitive than the regions from the periphery. We can conclude that the regional structure centre-periphery is the most obvious one and the acceleration of the growth and of the economic development from West to East, phenomenon which was accentuated after the accession of Romania to the EU.

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EXTERNAL DEBT AND ECONOMIC GROWTH IN GHANA: A CO-INTEGRATION AND VECTOR ERROR CORRECTION ANALYSIS

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Abstract:

This paper employed a co-integration analysis and an error correction methodology to examine the impact of external debt on economic growth in Ghana using annual time series for the period 1970-2017. We found that external debt inflows spur growth in Ghana both in the long-run and short-run. Secondly, our study also confirmed the crowding out effect and the non-linear effect of external debt in the long run and short-run. However, Debt overhang was only confirmed in the short-run.

We advocate for a judicious allocation of the debt resources so that the cost of servicing the debt will not outweigh the benefit of the borrowed funds.

Keywords: external debt, economic growth, economic development, Johansen Co-integration, time series models, Ghana.

JEL Classification: F34; F43; F63; C01; C32; N17.

Introduction

Ghana[7] and many other developing countries face a dire savings and investment gap which to a larger extent has constrained the speed of economic growth and sustainable development. In view of this, sourcing for external funding to supplement domestic revenue has become necessary. However, the accumulation of such foreign loans with it repayment terms has put developing countries including Ghana into a bad fiscal position. Ghana has always being a recipient of development assistance (grants and loans) on average US$ 300million between 1960 and 2003 MOFEP (2009). Studies on the economic prospects of external debt in the developing world have diverse findings. Notable among studies that explains the positive effect of external debt on economic include: Elbadawi *et al.* (1996), Schclarek (2004), Siddique *et al.* (2015), Diego *et al.* (2009), Rolf (2005). On the other-hand Todaro and Smith (2009), Fosu (1996), Cunningham (1993), Chowdhury (2001), Iyoha (1999) found a negative effect of external debt on economic growth. Eaton (1993) argued that external debt complements domestic savings and investment, hence it enhances growth. World Bank (2010) affirms that Ghana's debt stock also saw an appreciable increase after the implementation of the SAP[8] and ERP[9]. According to World Bank (2004) Ghana's

[7]Ghana is a country located along the Gulf of Guinea and the Atlantic Ocean in the sub-region of West Africa
[8]Structural Adjustment Programme
[9]Economic Recovery Programme

debt was cancelled under the HIPC[10] initiative in July 2005 by G8[11] countries. However, the debt stock of the country still saw an appreciable increase. Estimates from International Debt Statistics (2019) indicates that the debt stock from 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017 in current US dollar prices has been US$7,385.0million, US$9,110.1million, US$11,220.5million, US$12,833.2million, US$16,637.9million, US$18,369.5million, US$20,633.3million, US$21,371.5 million and US$22,022.4 million respectively. To this end, the contribution of this paper is to provide some fresh evidence by relying on current data to estimate the impact of external debt on economic growth in Ghana.

Albeit our study follows Frimpong and Oteng-Abayie (2006) who estimated the same phenomenon for the Ghanaian economy. However, our study differ from theirs on the account of the following;

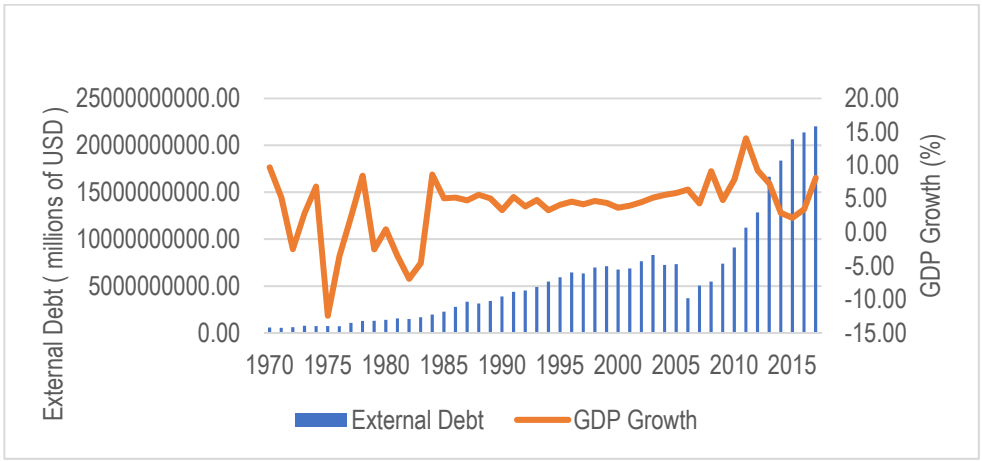
- Our study estimated for the non-linear effect between external debt and economic growth in Ghana.
- We employed recent data from 1970-2017 in a bid to provide some fresh evidence to the debt-growth analysis.

Findings are that our normalized long-run coefficients on GDP growth shows at 5% significance level, external debt has a positive impact on GDP growth in Ghana. This corrobotaes Frimpong and Oteng-Abayie (2006) for Ghana but contradicts Asafo *et al.* (2019) for Sub-Saharan Africa. In addition, total debt servicing variable which captures the crowding out effect of external shows a negative relationship with GDP growth in the long-run. The implication is that the benefit of borrowing is being offset by the astronomical cost of debt servicing. Futhermore, investment variable positively impacts GDP growth in the long-run. This finding disproves debt overhang in our study in the longrun but corroborates Frimpong and Oteng-Abayie (2006) who found a negative impact between the investment variable and GDP growth. Lastly, our study confirmed that at 5% level of significance, the square of external debt variable explains GDP growth. The implication is that beyond a certain limit; additional debt accumulation is deleterious to GDP growth. This confirms Fosu (1996) but contradicts Asafo *et al.* (2019) and Senadza *et al.* (2017).

Our short-run error correction estimates do not differ so much from our long-run nomalization growth coefficients. There is evidence that in the short run, external debt inflows stimulates growth. Also, total debt servicing negatively impacts growth confirming the crowding out effect of external debt. Debt overhang is confirmed via the negative sign between the investment variable and GDP growth. According to Krugman (1988), Sachs (1989), Anyanwu (1994) the negative sign on investment explains the deleterious effect of external debt on GDP by decreasing capital formation and encourage capital flight due to future tax increase expectations. Lastly, we also confirm a non-linear relationship between external debt and GDP growth giving credence to the Debt Laffer Curve theory. In addition, our error correction term is negative and statistically significant implying that GDP growth adjusts from short-run disequilibrium to long-run equilibrium at a speed of 0.57 percentage points.

Figure1 below provides some graphical explanation of the movement of external debt and economic growth in our study sample. External debt which is the blue bar graph has been on an upward trend since the 1970s whreas output growth in the red colour showing some undulatimg trajectory.

Figure 1. External Debt and GDP Growth, 1970-2015



Source: Author's plot

[10]Highly Indebted Poor Countries

[11]Group of eight highly industrialized nations who hold annual meetings to fosters consensus on global issues. These countries are: France, Germany, Italy, United Kingdom, Japan, United States, Canada and Russia

The rest of the paper is as follows: Section 2 gives an empirical account or recent literature, Section 3 econometric method, results and some battery of test, Section 4 gives the concluding remarks.

1. Empirical Review

A chunk of the literature on the external debt and economic growth has mainly tried to empirically establish debt overhang or the crowding effect of external debt on economic growth. This chapter gives an account of empirical review on external debt and growth nexus from old to recent findings.

Elbadawi *et al.* (1996) adopted a non-linear fixed effect panel model of 99 countries including SSA to estimate the relationship between external debt, investment and economic growth. They found that current debt stimulates growth whilst the lagged debt variable is deleterious to growth. Their study corroborates the literature that excessive debt hampers investment and growth in developing countries thus, a confirmation of debt overhang and crowding out effect of external debt. Fosu (1996) used an augmented aggregate production function to establish a non-linear relationship between debt and growth in SSA, thus confirming the Debt Laffer Curve hypothesis. Iyoha (1999) employed a simulation approach to investigate the impact of external debt on economic growth in Sub-Saharan Africa countries for the period 1970 to 1994. His finding revealed that mounting external debt depresses investment through both a "disincentive effect" and a "crowding-out effect". He again revealed that external debt stock reduction would have significant positive impact on investment and economic growth. Were (2001) estimated the impact of external debt on economic growth and private investment in Kenya using time series data from 1970-1995. Findings from this study confirmed debt overhang in Kenya since accumulated debt negatively impacts growth in Kenya. Mwaba (2001) used ordinary least squares regression to estimate a basic growth equation on the negative impact that accumulated external debt has on economic growth in Uganda. The estimated results confirmed that accumulated debt has a negative and statistically significant deleterious impact on growth whilst current debt inflows has a positive impact on growth. Frimpong and Oteng-Abayie (2006) used a co-integration and an error correction on annual data from 1970-1999 to estimate the effect of external debt on economic growth in Ghana. They found that total debt servicing has a negative impact on growth whereas external debt has a positive impact. In addition, their paper highlights debt overhang effect and crowding out effect explained by debt accumulation and debt servicing respectively. Sulaiman and Azeez (2012) evaluated the influence of external debt on economic growth in Nigeria from 1970 to 2010 using Vector Error Correction Approach. They found that external debt have a positive effect on economic growth of Nigeria.

Kasidi and Said (2013) employed co-integration and vector error correction to examine the external debt-growth nexus in Tanzania from 1990 to 2010. Their findings are that external debt affects growth positively whereas debt service payment influences growth negatively. Siddique *et al.* (2015) used a panel data revealed that there exists short and long-run causality running from external debt service to GDP for the period of 1970-2007 for the heavily indebted poor (HIPC) countries. Abdullahi Hassan *et al.* (2016) employed an autoregressive regressive distributed lag (ARDL) approach on annual data from 1970-2014 to estimate the debt-GDP nexus in Ghana. The study revealed significant positive impact of external debt on the economic growth in Ghana while total debt service has significant negative impact. The study further revealed the existence of debt overhang and crowding-out effects due to increasing external debt accumulation and its cost of service. Senadza *et al.* (2017) used system Generalized Methods of Moment technique on annual data from 1990 to 2013 for 39 sub-Saharan African countries to check for the relationship between external debt and economic growth. The paper fonnd a negative impact between debt and growth. In addition, the categorization of the countries to check if the income per capita affects the debt-growth relationship is not statistically significant. Results also revealed that there is no non-linear relationship between external debt and economic growth. Asafo *et al.* (2019) used similar approach as Senadza *et al.* (2017) on improved data from 1990-2017. Findings are that contemporaneously, external debt is deleterious to growth. In addition, the study found that accumulated debt stimulates growth. Furthermore, the study also found external debt and economic growth has no non-linear relationship. Lastly, the SSA were classified as rich or poor SSA. Findings indicate that being a poor or rich SSA country does not preclude debt from hampering the growth potentials of those countries.

2. Econometric Method

Estimation of empirical results is carried out using annual time series data for the period 1970 to 2017. Datasets were taken from World Development Indicators (WDI) in 2018. Time series variables used in this study are annual growth rate of GDP; log of external to GDP; log total debt service to export ratio (capture crowding effect of external debt); log of gross capital formation to GDP (proxy for investment); foreign direct investment to GDP; log of growth rate of export capacity to import; oil rents to GDP and log of square of external debt to GDP (capture non-linear effect of external debt).

The paper starts with a specification of the growth equation in a semi-log long-run form following Frimpong and Oteng-Abayie (2006) The subsequent model estimation is further carried out using a unit root test, Johansen co-integration test and finally a Vector Error Correction Model (VECM). The semi-log long-run form of the growth equation is shown in Equation (1) below:

$$GDP_t = \psi_0 + \psi_1 LnDEBT_t + \psi_2 LnTDS_t + \psi_3 LnINV_t + \psi_4 FDI_t + \psi_5 LnEXPORTS_t + \psi_6 OILRENTS_t + \psi_7 Square\_LnDEBT_t + \varepsilon_t \quad (1)$$

where: GDP_t= Annual growth of output; $LnDEBT_t$ = Log of external debt to GDP; $LnTDS_t$=Log of total debt service to export ratio; $LnINV_t$ = Log of gross capital formation to GDP; FDI_t = Foreign direct investment to GDP; $LnEXPORTS_t$= log of growth rate of export capacity to import; $OILRENTS_t$ = oil rent to GDP; $Square\_LnDEBT_t$ = Square of log of external debt; ε= N~(0, σ^2)and t =time.

2.1. Testing for Stationarity

In view of the fact that macroeconomic time series exhibit non-stationary tendencies, it is quite known in the literature that spurious correlations may emerge among variables which are non-stationary over time see Granger and Newfold (1974), Phillips (1986). To this end we perform standard unit root test following Dickey and Fuller (1979), Dickey and Fuller, (1981), Phillips and Perron (1988) to check for unit root in our time series. Perron (1989) argues that in the presence of a structural break, the ADF[12] tests are biased towards the non-rejection of the null hypothesis hence the PP[13] test will be used as robustness check for the ADF results. The ADF model can be tested by the estimation of α_2 from the Equation (2) below:

$$\Delta Y_t = \alpha_0 + \alpha_{1t} + \alpha_{2t} y_{t-1} + \sum_{i=1}^{k} \theta_i \Delta y_{t-1} + \varepsilon_t \quad (2)$$

where: Δ = first difference operator; y = time series variable under test, t= time; k= appropriate lags selected using the AIC; θ = coefficients, ε = residuals. If we reject the null hypothesis that the series has unit root then our series is stationary over time.

To the contrary, if we fail to reject the null hypothesis that the series has unit root, then our series is non-stationary. (Table 1) below shows the results of the unit root test for the ADF test and PP tests. Findings are that GDP and oil rents were all I(0) both the ADF test and the PP test. However, our main aim is to conduct a Johansen co-integration test to ascertain the long-run properties in our variables, hence we take the first difference of all variables. In both the ADF test and PP test, all our variables are stationary I(1). This meant that the prerequisite for the Johansen co-integration test is satisfied.

Table 1. Unit Root Test

Variables	ADF statistic		PP Test Statistic	
	Level	Diff.	Level	Diff.
GDP	-4.479***	-6.312***	-4.491***	20.550***
LnDebt	-1.710	-6.245***	-1.768	-6.246***
LnTDS	-1.379	-6.766***	-1.446	6.756***
LnINV	-1.712	-7.509***	-1.664	7.571***
FDI	-0.951	6.341***	-1.014	6.667***
LnExports	-1.483	5.269***	-1.244	5.241***
Oil Rents	-2.791*	5.770***	-2.249	5.770***
Sqrt_LnDebt	-2.151	3.480**	-1.802	5.991***

Source: Author's calculation. *(Note: * ,**,*** refers to 10%, 5% and 1% levels of significance.)*

2.2. Johansen Co-Integration Test

The Johansen co-integration which was propounded by Johansen (1988) will be employed to test for the number of co-integrating vectors. This test takes its basics from the unrestricted VAR (p) as shown in the Equation (3). The optimal lag length to explain the dynamics in our model was p=2 as indicated by the AIC in Table. 2.

$$y_t = u + \sum_{i=1}^{p} \beta_i y_{t-1} + \varepsilon_t \quad (3)$$

where: y_t= all endogenous variables in the model, p = lag order β_i = matrix of coefficients, ε_t= the disturbance term with N~(0, σ^2).

The VAR is reconstituted in equation 4 as follows:

[12]Augmented Dicker-Fuller Test for unit root
[13]Phillips Perron Test for Unit root

$$Y_t = u + \beta_i Y_{t-1} + \sum_{i=1}^{p-1} \psi_i \Delta Y_{t-1} + \psi_f Y_{f-1} + \varepsilon_t \quad (4)$$

where: ψ_i = -I+ β_1+…+ β_i (I is a unit matrix), y = endogenous variables, ε_t is an error term with zero mean and constant variance.

In the instance where all variables in y_t are not co-integrated, then the rank of ψ_f (NxN matrix) can be equal to N. If the rank of ψ_f is equal to R but less than N, then R in the number of co-integrating vectors that exists which represent ψ_f such that -ψ_f = αβ', where α and β are NxR matrices.

Johansen proposed Maximum Eigen-value test statistic and Trace test statistic are based on the number of significant eigenvalues of β. A test of zero restrictions on α is the test of weak exogeneity when the parameters of interest are long-run.

Engel (1983) introduced weak exogeneity as a sufficient condition for valid inference on the coefficients of a conditional distribution in a framework of I(0) variables, still holds when variables are I(1) and there is co-integration. Engel and Granger (1987) posits that the simple way to check weak exogeneity for the parameters of interest is to estimate an error correction model and test the significance of the error correction term in the model.

(Table 3) and (Table 4) shows results of the Trace test and the Maximum- Eigen value test respectively. Starting with the null hypothesis of no co-integration among the variables, the Trace test and the Maximum Eigen-value test both reject the null hypothesis at 5% level of significance. The Trace test shows 4 co-integrating equations whilst the Maximum Eigen-value test shows 2 co-integrating equations. This meant that variables in our model exhibits a common stochastic trend implying there exists a long run relationship between them.

Table 2. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-333.2783	NA	0.003556	17.06392	17.40169	17.18604
1	-134.1829	308.5978*	4.41e-06*	10.30915	13.34913*	11.40831*
2	-62.69230	82.21422	4.52e-06	9.934615*	15.67680	12.01081

Date: 11/29/18 Time: 14:43
Sample (adjusted): 1978 2016
Included observations: 39 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP LNDEBT LNTDS LNINV FDI LNEXF
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic
None *	0.911229	272.4071
At most 1 *	0.775113	177.9610
At most 2 *	0.632148	119.7669
At most 3 *	0.608634	80.76398
At most 4	0.429095	44.17762
At most 5	0.277456	22.31684
At most 6	0.201961	9.642751
At most 7	0.021420	0.844451

Trace test indicates 4 cointegratingeqn(s) at the
* denotes rejection of the hypothesis at the 0.05
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's calculation (*Notes:* ,**,*** refers to 10%, 5% and 1% levels of significance, NA refers to non-available)*

Table 3. Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.911229	272.4071	159.5297	0.0000
At most 1 *	0.775113	177.9610	125.6154	0.0000
At most 2 *	0.632148	119.7669	95.75366	0.0004
At most 3 *	0.608634	80.76398	69.81889	0.0052
At most 4	0.429095	44.17762	47.85613	0.1063
At most 5	0.277456	22.31684	29.79707	0.2812
At most 6	0.201961	9.642751	15.49471	0.3092
At most 7	0.021420	0.844451	3.841466	0.3581
Trace test indicates 4 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's calculation (*Notes:* , **,*** refers to 10%, 5% and 1% levels of significance.)*

Table 4. Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.911229	94.44603	52.36261	0.0000
At most 1 *	0.775113	58.19414	46.23142	0.0018
At most 2	0.632148	39.00292	40.07757	0.0657
At most 3 *	0.608634	36.58636	33.87687	0.0232
At most 4	0.429095	21.86078	27.58434	0.2276
At most 5	0.277456	12.67409	21.13162	0.4827
At most 6	0.201961	8.798300	14.26460	0.3033
At most 7	0.021420	0.844451	3.841466	0.3581
Max-eigen-value test indicates 2 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

The normalized co-integrating coefficients are presented in (Table. 5) below which shows a long-run relationship between GDP growth and the other variables. The model shows that our variables of interest (External debt, Total debt servicing, investment and square of external debt) have their right theoretical signs. Albeit they are all not statistically significant, their signs corroborates the literature nonetheless. Firstly, external debt shows a significant positive impact long-run coefficient of (-28.18) on growth. Secondly, total debt servicing coefficient of (0.136) indicates a negative impact on growth. This captures the crowding out effect of external debt on growth implying that government receipts (fiscal receipts, export receipts among others) and other borrowings will be used for debt servicing as opposed to growth enhancing investment. We can extrapolate that the benefit of borrowing is curtailed by the high debt servicing cost. Furthermore, we found that the long-run parameter for investment is (-1.195). This indicates a positive impact of investment on growth albeit, not statistically significant. This finding differs from Frimpong and Oteng-Abayie (2006) who found a negative sign on investment. Lastly, the square of debt coefficient of (4.268) indicates a negative and statistically significant relationship between square of external debt variable and growth. This confirms the non-linearity between external debt and growth (Debt Laffer curve hypothesis). The implication is that beyond a certain limit of external debt accumulation, additional debt is detrimental to growth. This contradicts findings of Asafo *et al.* (2019), Senadza *et al*. (2017) but corroborates Fosu (1996).

Table 5. Normalized Long Run Growth Equation

Variable	Coefficient	Standard error	t-statistic
LnDebt	-28.182	7.302	-3.859**
LnTDS	0.136	0.338	0.402
LnINV	-1.195	0.895	-1.33
FDI	0.287	0.127	2.259
LnExports	-6.048	0.787	-7.684***
Oil Rents	0.823	0.205	4.014**
Sqrt_LnDebt	4.268	0.883	4.833**

*Notes: *, **,*** denotes 10% , 5% and 1% level of significance, Ln denotes logarithm*

2.3. Vector Error Correction Model (VECM)

In view of the fact that the variables show a common stochastic trend, we estimate an Error Correction Model to determine the dynamic features of the growth equation in the short term. We specify the short-run VECM as follows:

$$\Delta GDP_t = \psi_0 + \sum_{i=1}^{j} \psi_1 LnGDP_t + \sum_{i=1}^{j} \psi_2 \Delta LnDEBT_{t-1} + \sum_{i=1}^{j} \psi_3 \Delta LnTDS_{t-1} + \sum_{i=1}^{j} \psi_4 \Delta INV_{t-1} + \sum_{i=1}^{j} \psi_5 \Delta FDI_{t-1} + \sum_{i=1}^{j} \psi_6 \Delta LnEXPORTS_{t-1} + \sum_{i=1}^{j} \psi_7 \Delta OILRENTS_{t-1} + \sum_{i=1}^{j} \psi_8 \Delta Ln\ SQRTLnDebt_{t-1} + \gamma_1 ECT_{t-1} + \varepsilon_{1t} \quad (5)$$

where all the variables are described as before,

Δ = first difference operator, ECT_{t-1} = error correction term with one period lag, $\gamma =$ is the shortrun coefficient of the error correction term which should be between -1 and 0.

The results are presented in (Table 6). Our short-run estimates do not differ in sign and significance from the long-run normalization estimate on GDP. In the short-run the lagged debt variable positively and significantly impacts growth. This meant that debt accumulation in the short-run might be a stimulus for growth. Our lagged debt coefficient seems large implying that growth is sensitive to accumulated debt in the short-run. Total debt servicing negatively impacts GDP growth but not statistically significant. The negative sign of the debt servicing variable captures the crowding effect of external debt in the short-run. Furthermore, investment negatively impact growth confirming debt overhang in the short-run. The square of debt is negative and statistically significant confirming the existence of a non-linear relationship between external debt and growth in the short-run. Lastly, the error term is negative and statistically significant implying that GDP moves from short-run disequilibrium to long-run equilibrium at a speed of 0.57 percentage points.

Table 6. Short-run Error Correction Growth Equation
Dependent Variable: ΔGDP_t

Variable	Coefficient	Prob.
ECT_{t-1}	-0.572594	0.0027***
ΔGDP_{t-1}	0.082453	0.6183
$\Delta LnDebt_{t-1}$	42.12370	0.0641*
$\Delta LnTDS_{t-1}$	-2.357628	0.3749
$\Delta LnINV_{t-1}$	-0.917404	0.7490
ΔFDI_{t-1}	0.050025	0.9913
$\Delta LnEXPORTS_{t-1}$	6.240308	0.0539**
$\Delta OILRENTS_{t-1}$	-0.728851	0.2240
$\Delta SQRT\_LnDebt_{t-1}$	-5.263045	0.0798*

Note: *, **, *** denotes 10% , 5% and 1% level of significance, Δ is the difference operator.

2.4. Battery of Tests

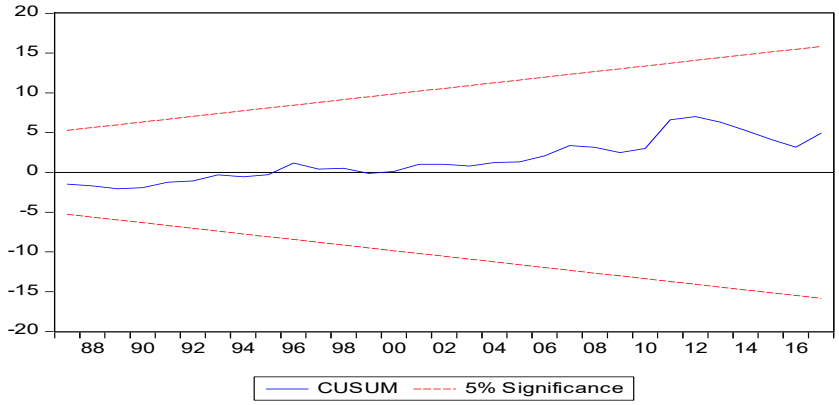
(Table 7) below shows evidence of some tests performed (serial correlation test, heteroscedasticity test and normality test) on our model. The Breusch- Godfrey serial correlation LM test has a null hypothesis of no serial correlation in the residuals. We fail to reject the null implying that our residuals are not serially correlated. Secondly, we test for heteroscedasticity (ARCH effect) in the residuals. We also fail to reject the null hypothesis of no heteroscedasticity (No ARCH Effect). However, our Jargue Bera test for normality was rejected perhaps due to the presence of outliers. The Cusum Test in (Figure. 2) indicates that the model satisfies the stability condition as the model lies within the 5% confidence band.

Table 7. Residual Diagnostic Test

Diagnostic test	Prob.
Serial correlation	0.5956
Heteroscedasticity	0.8830
Normality	0.000***

Note: *, **,*** denotes 10% , 5% and 1% level of significance.

Figure 2. The Cusum Test for Model Stability



Concluding Remarks

This paper used annual series from 1970-2017 to estimate the effect of external debt on economic growth in Ghana. We employed a Johansen co-integration and an error correction analysis. We found that external debt stimulates growth both in the long-run and the short-run in Ghana. Our study also confirmed the crowding out effect of external debt both in the short-run and long run. Furthermore, in the long-run, investment stimulates growth whilst the impact in the short-run is negative confirming debt overhang in the short-run only. We found evidence in favour of debt Laffer hypothesis which explains a non-linear relationship external debt and growth.

This paper further recommends policies that keeps debt at sustainable levels that is, fiscal expansion should be looked carefully especially during electioneering years. In addition, negotiation on interest payments on debts should be a huge concern for present and future governments since debt servicing has the tendency to cripple the growth potential of the economy.

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UNDERSTANDING CONSUMER PRICE INDEX DYNAMICS IN CANADA

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Abstract:

This research uses annual time series data on Consumer Price Index (CPI) in Canada from 1960 to 2017, to model and forecast CPI using the Box – Jenkins ARIMA technique. Diagnostic tests indicate that the C series is I (1). The study presents the ARIMA (1, 1, 1) model for predicting CPI in Canada. The diagnostic tests further show that the presented parsimonious model is stable. The results of the study apparently show that CPI in Canada is likely to continue on a sharp upwards trajectory in the next decade. The study encourages policy makers to make use of tight monetary and fiscal policy measures in order to control inflation in Canada.

Keywords: forecasting, inflation.

JEL Classification: C53; E31; E37; E47.

Introduction

Inflation is one of the central terms in macroeconomics (Enke and Mehdiyev 2014) as it harms the stability of the acquisition power of the national currency, affects economic growth because investment projects become riskier, distorts consuming and saving decisions, causes unequal income distribution and also results in difficulties in financial intervention (Hurtado *et al*. 2013). Consumer Price Index (CPI) may be regarded as a summary statistic for frequency distribution of relative prices (Kharimah *et al*. 2015). CPI number measures changes in the general level of prices of a group of commodities. It thus measures changes in the purchasing power of money (Monga 1977, Subhani and Panjwani 2009). As it is a prominent reflector of inflationary trends in the economy, it is often treated as a litmus test of the effectiveness of economic policies of the government of the day (Sarangi *et al*. 2018). Precisely forecasting the change of CPI is significant to many aspects of economics, some examples include fiscal policy, financial markets and productivity. Also, building a stable and accurate model to forecast the CPI will have great significance for the public, policy makers and research scholars (Du *et al*. 2014). In this study we use CPI as an indicator of inflation in Canada and then attempt to model and forecast CPI in Canada using the Box-Jenkins ARIMA technique.

1. Literature Review

Zivko and Bosnjak (2017) studied inflation in Croatia using ARIMA models with a data set ranging over the period January 1997 to November 2015 and established that the ARIMA (0, 1, 1)x (0, 1, 1)12 is the optimal model for forecasting inflation in Croatia. In Albania, Dhamo *et al*. studied CPI using SARIMA models with a data set

ranging over the period January 1994 to December 2007 and discovered that SARIMA models are satisfactory for a short-term prediction compared to the multiple regression model forecast. Nyoni (2018) studied inflation in Zimbabwe using GARCH models with a data set ranging over the period July 2009 to July 2018 and established that there is evidence of volatility persistence for Zimbabwe's monthly inflation data. In another study, Nyoni (2018) modeled inflation in Kenya using ARIMA and GARCH models and relied on annual time series data over the period 1960 – 2017 and found out that the ARIMA (2, 2, 1) model, the ARIMA (1, 2, 0) model and the AR (1) – GARCH (1, 1) model are good models that can be used to forecast inflation in Kenya. Nyoni and Nathaniel (2019), based on ARMA, ARIMA and GARCH models; studied inflation in Nigeria using time series data on inflation rates from 1960 to 2016 and found out that the ARMA (1, 0, 2) model is the best model for forecasting inflation rates in Nigeria.

2. Materials and Methods

2.1. Box – Jenkins ARIMA Models

One of the methods that are commonly used for forecasting time series data is the Autoregressive Integrated Moving Average (ARIMA) (Box and Jenkins 1976, Brocwell and Davis 2002, Chatfield 2004, Wei 2006, Cryer and Chan 2008). For the purpose of forecasting Consumer Price Index (CPI) in Canada, ARIMA models were specified and estimated. If the sequence $\Delta^d C_t$ satisfies an ARMA (p, q) process; then the sequence of C_t also satisfies the ARIMA (p, d, q) process such that:

$$\Delta^d C_t = \sum_{i=1}^{p} \beta_i \Delta^d C_{t-i} + \sum_{i=1}^{q} \alpha_i \mu_{t-i} + \mu_t \quad (1)$$

which we can also re – write as:

$$\Delta^d C_t = \sum_{i=1}^{p} \beta_i \Delta^d L^i C_t + \sum_{i=1}^{q} \alpha_i L^i \mu_t + \mu_t \quad (2)$$

where: Δ is the difference operator, vector $\beta \in R^p$ and $\alpha \in R^q$.

2.2. The Box – Jenkins Methodology

The first step towards model selection is to difference the series in order to achieve stationarity. Once this process is over, the researcher will then examine the correlogram in order to decide on the appropriate orders of the AR and MA components. It is important to highlight the fact that this procedure (of choosing the AR and MA components) is biased towards the use of personal judgement because there are no clear – cut rules on how to decide on the appropriate AR and MA components. Therefore, experience plays a pivotal role in this regard. The next step is the estimation of the tentative model, after which diagnostic testing shall follow. Diagnostic checking is usually done by generating the set of residuals and testing whether they satisfy the characteristics of a white noise process. If not, there would be need for model re – specification and repetition of the same process; this time from the second stage. The process may go on and on until an appropriate model is identified (Nyoni 2018).

2.3. Data Collection

This study is based on a data set of annual CPI (C) in Canada ranging over the period 1960 – 2017. All the data was gathered from the World Bank.

2.4. Diagnostic Tests and Model Evaluation

2.4.1. Stationarity Tests

2.4.1.1. The ADF Test

Table 1. Levels-intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	0.089399	0.9622	-3.552666	@1%	Non-stationary
			-2.914517	@5%	Non-stationary
			-2.595033	@10%	Non-stationary

Table 2. Levels-trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	-2.236151	0.4608	-4.130526	@1%	Non-stationary
			-3.492149	@5%	Non-stationary
			-3.174802	@10%	Non-stationary

Table 3. Without intercept and trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	2.110425	0.9910	-2.606911	@1%	Non-stationary
			-1.946764	@5%	Non-stationary
			-1.613062	@10%	Non-stationary

Tables 1 – 3 indicate that C is non-stationary in levels.

Table 4. 1st Difference-intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	-3.807637	0.0049	-3.552666	@1%	Stationary
			-2.914517	@5%	Stationary
			-2.595033	@10%	Stationary

Table 5. 1st Difference-trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	-3.775706	0.0253	-4.130526	@1%	Non-stationary
			-3.492149	@5%	Stationary
			-3.174802	@10%	Stationary

Table 6. 1st Difference-without intercept and trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
C	-10.15676	0.0000	-3.555023	@1%	Stationary
			-2.915522	@5%	Stationary
			-2.595565	@10%	Stationary

Tables 4 – 6 indicate that the C series is stationary after taking first differences.

2.5. Evaluation of ARIMA models (with a constant)

Table 7. Model evaluation

Model	AIC	U	ME	MAE	RMSE	MAPE
ARIMA (1, 1, 1)	**153.9987**	0.48666	0.033196	0.67787	0.87766	1.8374
ARIMA (1, 1, 0)	154.07	0.52295	0.018302	0.67913	0.89392	1.9378
ARIMA (0, 1, 1)	163.8655	0.66239	0.0072621	0.74061	0.96917	2.2244
ARIMA (2, 1, 1)	155.8095	0.48723	0.03899	0.68168	0.87611	1.8464
ARIMA (1, 1, 2)	155.7938	0.48765	0.039006	0.68152	0.87601	1.8478
ARIMA (2, 1, 2)	157.7934	0.48763	0.033909	0.68161	0.876	1.8479

A model with a lower AIC value is better than the one with a higher AIC value (Nyoni 2018). Theil's U must lie between 0 and 1, of which the closer it is to 0, the better the forecast method (Nyoni 2018). The study will consider both the AIC and the U as the criterion for choosing the best model for forecasting CPI in Canada. Therefore, the ARIMA (1, 1, 1) model is eventually selected.

2.6. Residual and Stability Tests

2.6.1. ADF Tests of the Residuals of the ARIMA (1, 1, 1) Model

Table 8. Levels-intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
R_t	-7.015789	0.0000	-3.555023	@1%	Stationary
			-2.915522	@5%	Stationary
			-2.595565	@10%	Stationary

Table 9. Levels-trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
R_t	-6.943109	0.0000	-4.133838	@1%	Stationary
			-3.493692	@5%	Stationary
			-3.175693	**@10%**	**Stationary**

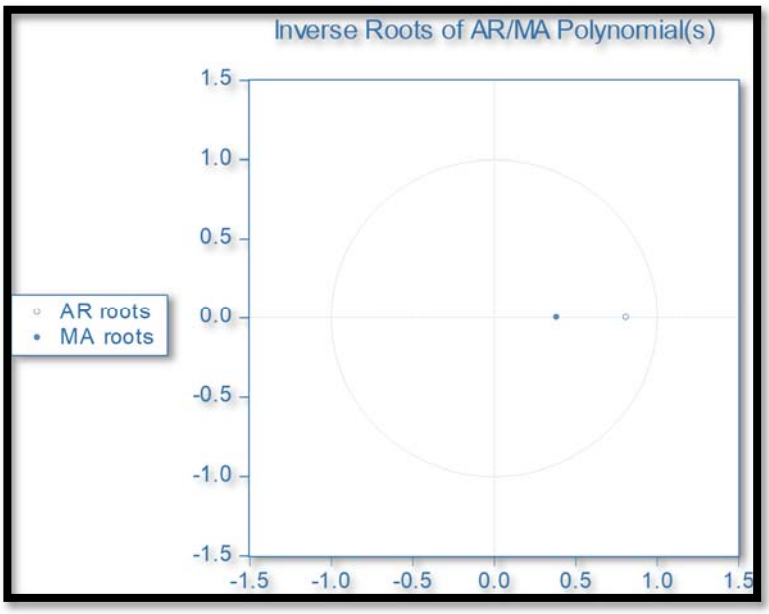
Table 10. Without intercept and trend and intercept

Variable	ADF Statistic	Probability	Critical Values		Conclusion
R_t	-7.080735	0.0000	-2.607686	@1%	Stationary
			-1.946878	@5%	Stationary
			-1.612999	@10%	Stationary

Tables 8, 9 and 10 reveals that the residuals of the ARIMA (1, 1, 1) model are stationary.

2.6.2. Stability Test of the ARIMA (1, 1, 1) Model

Figure 1. Inverse Roots



Since the corresponding inverse roots of the characteristic polynomial lie in the unit circle, it illustrates that the chosen ARIMA (1, 1, 1) model is indeed stable and suitable for predicting CPI in Canada over the period under study.

3. Findings

3.1. Descriptive Statistics

Table 11. Descriptive Statistics

Description	Statistic
Mean	58.862
Median	62.5
Minimum	13
Maximum	112
Standard deviation	33.528
Skewness	-0.032287
Excess kurtosis	-1.4415

As shown above, the mean is positive, *i.e.* 58.862. The minimum is 13 while the maximum is 112. The skewness is -0.032287 and the most striking characteristic is that it is positive, indicating that the C series is positively skewed and non-symmetric. Excess kurtosis is -1.4415; showing that the C series is not normally distributed.

3.2. Results Presentation

Table 12. Results

ARIMA (1, 1, 1) Model:

$$\Delta C_{t-1} = 1.64731 + 0.816188\Delta C_{t-1} - 0.342036\mu_{t-1} \quad (3)$$

P: (0.0000) (0.0000) (0.0704)

S. E: (0.3709) (0.1138) (0.1891)

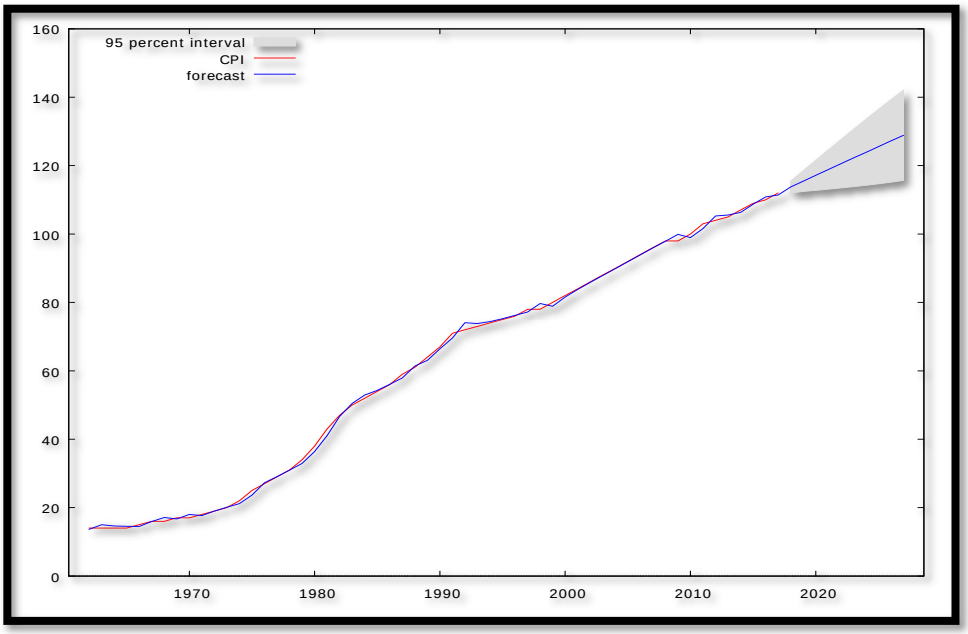
Variable	Coefficient	Standard Error	Z	p-value
Constant	1.64731	0.370874	4.442	0.0000***
AR (1)	0.816188	0.11383	7.17	0.0000***
MA (1)	-0.342036	0.189055	-1.809	0.0704*

Author's calculation (*Note: *, **, *** refers to 10%, 5% and 1% levels of significance, respectively*

The model constant is positive and statistically significant at 1% level of significance. This points to the fact that CPI in Canada cannot go below 1.65 even if the effect of the MA and AR components were to be ruled out. The coefficient of the AR (1) component is positive and statistically significant at 1% level of significance. This basically points to the fact that previous period CPI indices are important in determining the current and future levels of CPI in Canada. For example, when previous period CPI was relatively high; it arguably causes economic agents to anticipate even higher inflationary pressures in the next period thereby inducing policy ineffectiveness: in the long-run inflation goes up. The results of the study indicate that a 1% increase in the previous period CPI will lead to approximately 0.8% increase in the current period CPI. The coefficient of the MA (1) component is negative and statistically significant at 10% level of significance. This implies that unobserved shocks to CPI have a negative effect on current CPI in Canada. Such shocks include but are not limited to monetary policy shocks and political events. The results actually show that a 1% increase in such shocks will lead to approximately 0.34% decrease in CPI, thus a reduced level of inflation. For example, if a new government or political dispensation is elected into power in Canada; it could lower inflationary expectations and thereby enable policy makers to smoothly engineer disinflation and hence lower CPI levels. The overall striking feature of these results is that the coefficient of the AR (1) component is positive while the coefficient of the MA (1) component is negative as conventionally expected.

3.2.1. Forecast Graph

Figure 2. Forecast graph



3.2.2. Predicted CPI in Canada

Table 13. Predictions

Year	Prediction	Std. Error	95% Confidence Interval
2018	113.73	0.867	112.03 - 115.43
2019	115.45	1.544	112.42 - 118.47
2020	117.15	2.232	112.77 - 121.53
2021	118.84	2.923	113.11 - 124.57
2022	120.53	3.605	113.46 - 127.59
2023	122.21	4.272	113.83 - 130.58
2024	123.88	4.920	114.23 - 133.52
2025	125.54	5.547	114.67 - 136.42
2026	127.21	6.153	115.15 - 139.27
2027	128.87	6.737	115.67 - 142.07

Figure 2 (with a forecast range from 2018 – 2027) and Table 13, clearly show that CPI in Canada is indeed set to continue rising sharply, in the next decade.

4. Policy Implication and Conclusion

After performing the Box-Jenkins approach, the ARIMA was engaged to investigate annual CPI of Canada from 1960 to 2017. The study mostly planned to forecast the annual CPI in Canada for the upcoming period from 2018 to 2027 and the best fitting model was selected based on how well the model captures the stochastic variation in the data. The ARIMA (1, 1, 1) model, as indicated by the AIC statistic; is not only stable but also the most suitable model to forecast the CPI of Canada for the next ten years. In general, CPI in Canada; showed an upwards trend over the forecasted period. Based on the results, policy makers in Canada should engage more proper economic and monetary policies in order to fight such increase in inflation as reflected in the forecasts. Therefore, relevant authorities in Canada ought to rely more on tight monetary policy, which should be complimented by a tight fiscal policy stance.

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ON THE PSYCHOLOGICAL FOUNDATIONS OF ECONOMIC DEVELOPMENT

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Abstract:

This paper considered theoretical propositions on the psychological mechanism underlying economic growth and development in diverse nations, particularly how it accounts for variations in levels of per capita income across the globe. Descriptive and analytical techniques were employed in eliciting the basic parameters that underlie this psychological mechanism which motivates inevitably productive economic engagements in various countries of the world. Though the paper appeared to hypothesize a sort of psychological model of economic growth and development, it is merely an attempt in accounting for the growth and development experiences of diverse nations across the world from the theoretical standpoint of their underlying psychological considerations.

Keywords: economicollocation, psychological propensities, national pride, psychological image, national psychological capital, economifugal.

JEL Classification: E71.

Introduction

The pattern of profound output growth and economic development in terms of changes in real per capita income levels across diverse countries in recent times have generates critical analysis on what might be the motivating force behind all these developments. The dynamics of how human psychological dispositions in different economies could account for variations in growth rates and income per capita levels given the underlying psychological considerations of the economic behaviour of nations is certainly not an easy theoretical formulation. The transition of China in becoming the second largest economy in the world within a spate of less than three decades may be due to many factors but what could account for such a breathtaking transformation and increases in growth rates and income levels of its citizens accordingly is indeed not only worthy of due considerations but warrant explanations within the context of global economic interactions. Likewise is the need for an exposition of what could account for the sudden large or huge rise in the growth rates and per capita income levels of many countries from the perspective of what inspired or motivate such profound events. The paper is organized in to five sections. Following this exordium or introduction is Section 2 which provides a survey of related literature and brief overview on the psychological basis of economic engagements while Section 3 presents the perspectives on the psychological foundations of national economic engagements in diverse countries of the world. Section 4 provides the theoretical parameterization of the model while the modelling framework and analysis is the focus of Section 5 and then the concluding remarks.

1. Survey of Related Literature and Brief Overview

The issue of psychological basis for most economic engagements that ultimately resulted in growth trajectory as well as economic development of many nations is a subject that need critical attention and consideration. Nevertheless, it is imperative to note that some of the reinforcing mechanisms for national psychological disposition and tendencies (or 'patriotism') in many countries of the world are many. One of these is

sport. From experience, we do know that baseball as a sporting activity that unite many Americans than any other sport or recreational activity. The same is true of cricket in countries such as India, Sri Lanka and Australia while it is football in Nigeria, Brazil and Ghana. Moreover, the flags of many nations symbolize the psychological image of such countries. Defaming these national symbols sometimes has been meted with stiff penalties in many countries globally. The field of behavioural economics that is the branch of economics that deals with the psychological foundations of economic behaviour and theory is replete with many studies on how psychology is related with economics. Some studies have considered how psychology is related for instance to consumer choice (Hands 2010, 633-648) while some have looked at how incentives affect the performance of rational agents (Fehr and Falk 2002) Nevertheless, (Akerlof 2002, 411-433) conjectured that reciprocity, fairness, identity, money illusion, loss aversion, herding, and procrastination can possibly explain the considerable departures of real world economies from the competitive general equilibrium model with the implication that macroeconomics is based on psychological considerations. Recent studies such as (Muramatsu and Avila 2017, 363-380) explored an interpretation of why behavioural economics came into the complex field of development economics drawing on insights from methodology of economics as a field of study. Most recently, (Masciandaro and Romelli 2019) explored the theory of monetary policy design since the 1980s and highlighted the emerging role of central banker psychology.

While several studies have examined the psychological basis of economics and economic activity, there is virtually none that have specifically considered the psychological foundations of productive economic engagements and how that translated in to growth in per capita GDP across various countries of the world. In other words, why we set to understand and explain this fundamental problem or the issue of the psychological basis of economic development is because hitherto as far as we know what motivate economic activity resulting in disparate economic growth rates as well as growth in income per capita levels in many countries have not possibly been explored or given due considerations in economic literature.[14] The role which the psychological image of nations and their institutions play in spurring growth and real evolution in per capita income levels across diverse countries is critical. Moreover, the economic behaviour of nation-states in spurring economic development through creating a motivating atmosphere and incentive mechanisms for output growth suggests a significant influence of psychological parameters in macroeconomic activity globally. The reason is not far-fetched. Only motivated citizens can be involved in productive economic engagements. These postulates suffice for the attainment of a simple and consistent theory of the psychological foundations of economic development of nations using the basic tools of economic analysis. The theory to be developed is based – like all economic theories – on the application of economic analyses to this fundamental problem since the assertions of such a theory have to do with the relationships between the diverse patterns observed in per capita income levels across the nations making up the global economy and the underlying psychological influences such as patriotism, 'national image or pride' etc. had in the coercion and mobilization of citizens in diverse countries across the globe for the purpose of national economic advancement. However, insufficient consideration of these issues lies at the root of the difficulties with which the psychology of national economic behaviour encounters at present. This paper which is actually a theoretical essay addresses these issues to some extent. It is however approached purely from a heuristic perspective or standpoint. However, it might possibly provide insights in to our understanding of human affairs thereby advancing the frontier of theoretical economics towards a broader horizon. Moreover, it is imperative to stress that this paper only attempts to explain what account for profound growth experiences and eventually increased per capita income levels in many countries from the viewpoint of psychological considerations such as the habits, instincts, incentives, sanctions, satisfaction, and motivations that promote or negatively affect citizenship and patriotism in many nations. Psychological considerations vis-à-vis patriotism (with all its commitments) in a nation more than anything are capable of unleashing new and dynamic economic forces which would stimulate creativity, innovation and economic activity on broader scale than ever seen. If there is a pervading atmosphere of pessimism in a country regarding patriotism, the level of motivation to work through productive engagements for the advancement of such an economy would be low. The contributions of its citizens by implication would worth less compare to when there is a pervasive atmosphere of optimism about macroeconomic variables in the country. The latter development would much more likely result in optimal allocation of productive resources as well as economic decisions that optimally advanced the course or frontier of the nation's economy not only in terms of output growth but also in per capita income terms. In other words or put differently, the psychological atmosphere that enveloped an entire economic system and processes unleashes the forces of motivations, incentives, habits, pessimism or optimism, and euphoria etc. that over time have been known to greatly influenced economic activities. The effect of political and social upheavals on a nation's Stock Exchange is a classic example. All these are against

[14] While the origin of psychology or psychological basis for economic decision making and choices can be traced to the Austrian School of Economics especially those masters as Carl Menger, Bohm-Bawerk etc., there is no gainsaying that almost if not every rational economic choices are based on psychological considerations.

the background that there is an underlying system of motivations and psychic rewards that sustains most economies especially those that are operated on the *laissez faire* model. Nevertheless, the attainment of a perfect nation in terms of economic sovereignty and efficiency (immune from these psychological forces) in any part of the world is no doubt a Sisyphean task or endeavour. Constructing a theory of the psychological foundations of economic development is certainly not the affirmation or attestation of a specific statistical relationship or law among variables in any real economy but rather an attempt on how to account for this perceived phenomenon in economic science lately fundamentally within an *Apollonian* global economy. It is pertinent to stress however that theory here implied the narrower sense of the explanation or exposition of a specific fundamental economic issue or problem. Whether the theoretical postulates and propositions raised here in this paper would suffice for the attainment of a well-validated theory we would leave till later towards the end of the paper.

2. The Psychological Foundations of National Economic Engagements

Inherent in the economic development of many nations of the world is the psychological dimension that is closely associated with nationalism and patriotism which has strong implications on growth and development[15]. Individuals ordinarily as rational optimizing agents would be primarily concerned with production and consumption, but governments of the different countries where they are citizens impinges on the consumer and producer free choice to varying degrees to advance the course of such nations or rather the promotion of their 'national pride'. The economic strength of many advanced and emerging economies is hinged on the bulwark of nationalistic and psychological sentiments by their citizens for the economic growth and development of such countries. Two succinct examples would suffice in addressing the fundamental problem of this proposition. They are U.S.A. and China. We first examine the United States in our exposition of the theory while we would consider China in a later section. The United States was founded on Judeo-Christian tradition as set forth in the *Mayflower Declaration* by the Pilgrim Fathers of the Non-Conformist persuasion in the sixteenth and seventeenth centuries when they left the shores of England or Great Britain to form the American Colonies (now U.S.A.) across the Atlantic. Since then, the economic growth and development of the American Colony, albeit U.S.A. have been assured independently of England on the other side of the Atlantic. Measures such as the civil liberties enshrined in the American Constitution since 1776 granting freedom of expression, unalienable liberty of every human or individuals etc. as well as the *New Deal* introduced by President Roosevelt in 1933 in the wake of the Great Depression of that period in the early 1930s had more often than not strengthen this position[16].

However, it was these same rights and privileges that some extremists or terrorists while enjoying in the States exploited or rather abused and destroyed during the September 11, 2001 attack on the World Trade Center in New York under the guise of achieving some extreme religious objectives. Therefore, the considerations of the growth and development of many nations are so complex and sophisticated in the developing and emerging nations and particularly more pronounced in the post industrial economies of the North. Individuals, firms and governments (as economic agents) in many countries aside having expectations from the nation no doubt derived psychological satisfaction or utility in supporting the advancement of their nations. What account for the mobilization of the whole populace of Britain by their wartime Prime Minister, Winston Churchill against Hitler and Nazi Germany is certainly more of psychological considerations and needs of national exigency for events that lead to the *Battle of Britain* and even after attested to the role or significance of this line of actions in the Second World War. Likewise was the *Atlantic Charter* between Great Britain and the United States in confronting the common enemy –Nazi Germany and the Axis Powers. This national mobilization of the British economy and population then not only helped in fighting the aggressor in belligerent Germany but also in the process of reconstruction after the war and provides impetus for the success of the Marshall Plan for the whole of Europe. That *post bellum* initiative set the stage for the recovery and resurgence of Europe in the global economy.

One remarkable instance related to the earlier mentioned proposition that citizens through their expectations derived psychological satisfaction in supporting the advancement of their nations is the well-known renunciation by Albert Einstein of his German citizenship and subsequent adoption of Swiss citizenship and nationality in the wake of the persecution of Jews and subsequent pogrom in the Holocaust. Also to this end or equally important is that had Scotland becomes independent in the referendum of 2014, it would be apparent that Scottish nationalism which has been dormant for hundreds of years but which finally come alive did not probably implied better times for

[15] Nevertheless, there is an apophthegm or maxim that states: "patriotism is the last refuge of a scoundrel"!

[16] The civil liberties in the States especially those enshrined in the *Declaration of Independence* and the *Constitution of the United States of America* are predated by earlier developments in its 'mother' country in the other side of the Atlantic *i.e*. Britain as can be seen in the great charter, *Magna Carta*, which was enacted on 15 June, 1215 and grants personal and economic liberty to the people of mediaeval England. The *Magna Carta* certainly set the stage for the transformation that follows the end of the Dark Ages particularly the *Industrial Revolution* in the eighteenth and nineteenth centuries.

Scottish whisky or the sublime Scottish culture but a new beginning for the prospective world's newest and youngest nation with promising prospects of being one of the wealthiest economies in the OECD.[17] The American spirit of free opportunities for all pervade the whole fabric of the U.S. economy ever since and this has provided the much needed background for the expression of patriotism on the part of its citizens within the context of the free enterprise, *laissez-faire* capitalist model that had characterized the country's production system since its independence.

For any nation to develop economically and otherwise, the onus lies on its citizens to spearhead and consistently pursued activities and processes that would inevitably lead to and result in such developments. At no point in time or history had the growth and development of any country been pioneered or brought about by citizens of other nations or foreigners as witnessed in the United States. While the U.S. economy is been fueled and developed optimally by migrants from many parts of the world who are attracted by the American spirit of free opportunities for all and guarantee of freedom of expression among other civil liberties that the American nation provides over the past two centuries and decades, the underlying theoretical basis is worthy of exploration. The mode of production or economic system of any nation to a large extent is determined by the political set up and process in such a country. This ultimately and fundamentally shapes the milieu of the citizens in such an economy towards issues of growth and development. The citizens and leaders of U.S.A. over the past two centuries have demonstrated a formidable commitment to the American spirit and nation which has ultimately result in its growth and development. The evolving institutions of democracy and free enterprise or *laissez-faire* had further cemented this commitment to such a high magnitude or extent than coercion or force can ever have achieved. Inherent in the human nature is the desire and yearning for freedom of expression and other liberties that a free sovereign nation can guarantee devoid of coercion and force thereby enabling the individuals or citizens to pursue their economic activity or endeavour.

A classic example is the mass relief and euphoria that accompanied the introduction of the "*glasnost*" and the "*perestroika*" in the ending days of the former Soviet Union. The rest is now history. Now, the individual's expectations towards the preservation and perpetuity of such enabling environment that the sovereign nation (which he is a citizen of) only can conferred on him *ab initio* of his decision making horizon. The economic agents' saving and investment decision and behaviour are inherently linked and this is uniquely characteristic of each and every given nation or country in the world, whether advanced, emerging or developing. Moreover, the aspect or dimension of how the psychological disposition of a nation predisposes or forms the basis of the saving rates in such a country is achieved or arrived at through the instrumentality of policy formulation and implementation. The saving and investment behaviour as well as decision of an average American is quite different from that of an average Nigerian or Mexican on the same level of per capita income or social status. Their saving and investment decisions as well as behaviour vary across countries and are dependent on the aggregate saving propensity of their respective countries. As the per capita income level of a nation increases or grows by a certain percentage or rate, let say, n, the psychological expectations of its citizens as rational optimizing agents towards its growth and development aspirations also increases by an approximate amount. This asymptotic approximate growth rate, $\approx n$, likewise corresponds to the growth rate of the aggregate saving and investment propensity of such a country relative to other economies of the world. Moreso, the intellectual base of any nation or economy also plays a vital or critical role in its growth and development as well as psychological ambitions and aggregation.

The pool of its intellectuals and academics no doubt has a significant effect on the technological advancement of such nations. From economic growth literature, the determinant of long run growth is technological progress. This is attributable to the quality and productivity of a nation's workforce anywhere in the world. The Jewish people have been particularly noted for industry and profound scientific discoveries and breakthroughs. Little wonder why Israel is one the most advanced nations on earth in terms of science and technology. Though dispersed across the world, with many of its intelligentsia living in the United States the psychological sentiments and attachments to the State of Israel is not in doubt and the significance of this on the Israeli economy and academia is not only well pronounced but also certainly assured. The chunk of research and patents that can be traced to the Hebrew University in Jerusalem is enormous (when compared to other reputable universities that have been established over many centuries ago) and is primarily due to its citizens. One remarkable fact from our analysis so far is that inextricably linked to the economic activities and considerations of the citizens of any particular

[17] The birth of new nations however do not always translate in to better living standards for their citizens. South Sudan, the youngest nation on the planet is a classic example. Since attaining independence following a referendum ending the long Sudanese Civil War in 2011, it has been engulfed in its own civil war due to power struggle in the political leadership of the country. Politics and psychology does not necessarily translate in to economics as far as nationalism or nationhood is concerned. Economic growth is a function of output which is dependent on physical and human capital endowments, though psychological factors could either promote or inhibit productivity.

nation are the psychological sentiments and dimension towards such a country which obviously has significant growth and development effects. This theoretical model of the psychological underpinning the economic development of nations is borne out of the need or necessity to understand some of the fundamental issues intricately linked to economic growth and development in terms of growth in income per capita levels but which are not obviously apparent or somewhat not explored hitherto.

The successive spate of nationalization and indigenization of public enterprises in many developing and emerging economies over the past few decades is an evidence or rather indicative of this theory of psychological sentiments as represented by nationalism in implying or accounting for the economic growth and development of nations. The recent nationalization of some public oil companies in Venezuela is a good example of this trend and phenomenon. Moreover, there are many situations and circumstances in a nation with underlying or apparent psychological basis which produced spin-off effects on growth and development thereafter. For example, the launching of communication satellites by a nation (which may be for national pride) would definitely impact on growth and development. The United States has the highest number people having or possessing dual citizenships in the whole world[18]. Hearing such hyphenated words as Nigerian-American, Indian-American, Chinese-American etc. is a commonplace. Migrants from all over the world who have settled permanently in the States have been integrated in to the mainstream American society and they obviously see themselves more as Americans than citizens of their native or originating countries. The only exception might possibly be the Chinese-Americans who obviously maintained a closer link and relationship with their country of nativity, China.

The *laissez-faire* model and the American spirit of free opportunities for all more than anything else reinforce and strengthen this psychological attachments to the American state by these erstwhile migrants now citizens of the United States of America. The demand for the psychological loyalty of migrants from diverse countries to the States is been created through the instrumentality of the civil liberties enshrined in the American constitution and its amendments as well as the quintessential spirit of free opportunities for all –the *American dream*. Somehow, the economic hardships been faced by many people and families across different nations create conversely a supply chain for psychological attachments and loyalty to any favourable nation for the migrating folk who are in search of greener pastures. This is a clear demonstration of *Say's Law* ("supply creates its own demand) in international labour mobility flows as well as the realignment of the psychological sentiment and loyalty to a conducive, accommodating or absorbing nation. The expectations model of a country for growth and development can be more aptly illustrated by the economy's expectations demand curve.

Figure1 provides a graphical illustration of the psychological dimension of economic development expectations. In a particular economy with a given population comprising mainly the nation's citizens is depicted against the level of economic development expectations. In (a), the diagram depict the scenario or situation of things before nationalization of state enterprises for instance, by the managers and government of this hypothetical economy[19]. The demand curve of this country's expectations for economic development can be observed to be very steep. This is obviously due to the inertia of the citizens of the country to growth and development of their domestic economy relative to the global economy. However, upon nationalization of such state owned enterprises as illustrated by (b), the demand curve becomes less steep. The demand curve becoming less steep as depicted by Figure1(b), is apparently not only due to the psychological effects of nationalization of these enterprises on the citizens, but also their reaction and disposition to growth and development from that point on. The adjustment process that occurred between (a) and (b) is facilitated by the differential effects observed in the psychological disposition of the citizens to economic growth and development. It is not an instantaneous process. The time lag is however not something that can be observed empirically, though its theoretical plausibility is certainly assured.

It is pertinent to stress that the psychological capital present and necessary for output growth and sustained per capita income improvements is more or less responsible for keeping most economies in well-ordered states. Undisrupted equilibrium cannot be maintained and sustained for long in any economy as the market forces cause unavoidable disequilibria many times over aside the uncertainty that pervades most economies.

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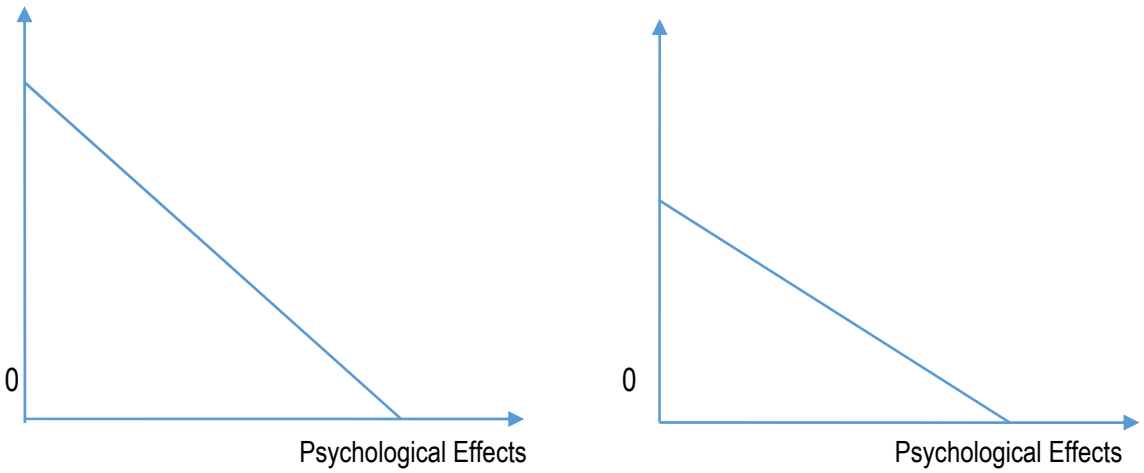
[18] The global euphoric success of Barack Obama (born of a Kenyan father and a white American mother) in the 2008 U.S. Presidential election in regard to his swearing-in as the first black or African-American President of the United States lay credence to the belief that America is a land of opportunities for all. This however is the result of a long fight against racism especially as championed by the late Civil Rights activist and Baptist minister, Martin Luther King who was assassinated in 1963.

[19] The market behaviour of multinational enterprises or corporations is another critical issue on the underlying psychological forces or considerations influencing economic activity across the borders of diverse countries of the world. The allegiance of multinational corporations (important as it were) is however a function of the free-play or rather interplay of the forces of international capital flows and might not primarily be to the parent nations of such corporations *ab initio*. Deciphering the thin line between the operations of these corporations and the influence of the governments in their parent nations in the murky waters of international geopolitics is however a Herculean task, if ever possible.

Figure 1. An Expectation Demand Curve before and after Nationalization

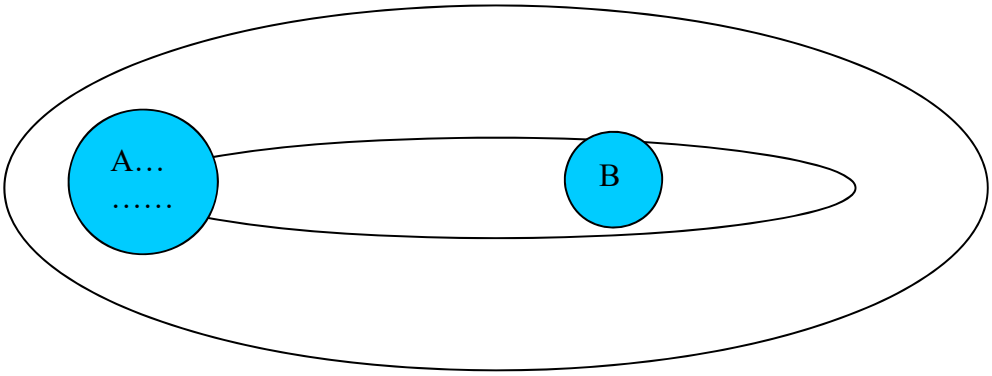


a. Expectation Demand curve before Nationalization b. Expectation Demand curve after Nationalization

Nevertheless, the state of the economy where virtually all agents, markets, forces, processes etc. at therein in it are set together in an ordered manner and space – *economicollocation* is highly critical for any meaningful transformation in economic growth and development to occur.[20] Another remarkable dimension in this psychological theory of economic development of nations is the role played by the size of and magnitude of a country's population in enforcing as well as reinforcing the psychological expectation models of the nation's citizens towards growth and development. The larger and closely connected the population of a country is, the higher the level of the expectations and possibility of events and policy outcomes that reinforces such expectation models. Conversely, the smaller the population of a country and the sparser their concentration and aggregation, the lesser or lower the possibility of such expectations and outcomes. Figure 2 depicts a hypothetical global economy comprising two countries A and B.

While A is larger in terms of population and is densely concentrated, B is relatively smaller and sparsely concentrated in terms of people. Now, in this framework of analysis, it is apparent that the expectations of citizens of country A would be higher relative to those of the citizens in country B because of the sheer fact of a larger population and the necessity for growth and development *ab initio* in comparing their stages of economic development as well as their initial natural endowments. Two real world examples that would suffice at this point are Venezuela and Mongolia. This is evident from the fact that the per capita land intensities for the two countries are 40 square metres and 500 square metres respectively[21]. They are located on different continents, hence the plausibility of their comparison in regard to this theoretical postulate, albeit, observation. This obviously drives home our point or explanation of this theory from this exposition.

Figure 2. A Hypothetical Global Economy Contour Model



[20] In real world scenarios, national economies can come to or rather arrive at a stage where they are devoid of disorderliness and hence achieved as a state of harmonious equilibrium permanently *ad infinitum*.

[21] Though China is the most populous nation on the earth (with an average per capita land mass or intensity of 7.8 square metres), Singapore is one of the countries with the lowest per capita land mass or intensity with an average of 0.2 square metres. The per capita land intensity or mass is computed by dividing a country's population by its total area or land mass in square kilometre and then expressing the result in square metre for a single individual.

3. Theoretical Parameterization

Hitherto, in economics, the underlying psychological motives or considerations in economic behaviour of individuals, firms and governments are ignored primarily in simplifying the assumptions of the frameworks of such analysis. More realistic theory would embrace them in order to examine all possible causes and parameters involved or connected to such analysis. What motivate the economic behaviour of individuals as citizens of different countries as statement of reality should be drawn so widely or rather more broadly to include all possible motives. One of these motives or considerations is psychological factors or parameters. It is expedient to stress at this point that one of the central underlying bases for economic activity in Adam Smith's treatise, *The Wealth of Nations*, is the notion that individuals as rational economic agents would work hard and increase their productivity and hence output growth if there is a system of incentives for them in so doing especially in a free market capitalist economy. This obviously connotes the underlying psychological foundations of economic activity right from classical times. We now turn our attention to consider the critical defining parameters in the psychological foundations of economic growth and development in many nations across the world.

There are some basic parameters that defined the psychological atmosphere of nations with critical implications on growth and development. Some of these parameters include national pride and image (as can be seen in the domain of space explorations), source of unity and national coercion (evident in sports such as cricket and football), technological research and national defence evident in huge research and development projects such as the Advanced Research Project Agency (ARPA) in the States in the 1960s which gave birth to the Internet as well as strong industrial military complexes in many countries. The national, psychological sentiments attached to indigenous domestic firms in many countries sometimes could be very strong. For instance, the psychological outlook or disposition of many Finnish would have diminished or plummeted when Nokia (the global firm producing mobile phones) which originated from Finland was bought up or took over by Microsoft, an American firm. The same is true of the Mercedes Benz car for Germany and the Samsung Smartphone for South Korea.

Before we turn our attention to the analysis of China in explaining the psychological theory of economic growth and development of nations, we would digress a bit and discuss an interesting evidence of this theory – Space Exploration. When the former Soviet Union launched the first artificial satellite, *Sputnik I*, on 4 October 1957 thus starting or heralding the space age, there is no doubt that it was primarily inspired by a national, psychological ambition to beat or overtake its rival, the United States in the race and exploration of outer space. It is evidently clear that the feat by the Soviets spurred the Americans to embark upon a gigantic space programme that witnessed the launch of many space satellites and probes to the moon as well as interplanetary missions to Mars and distant galaxies over the past five decades. The spectacular landing of astronauts Neil Armstrong, Michael Collins and Edwin Aldrin as the first men on the moon on 16 July 1969 is indeed a remarkable achievement by the Americans, though Yuri Gagarin (a Soviet astronaut was the first man in Space). These two nations, the United States of America (U.S.A) and the defunct Soviet Union for many years were the only ones in the space exploration race. The technological advancement as well as the economic or financial costs that is associated and which comes with these exploration activities are huge and profound, nevertheless they result in the economic growth and development of these nations.

Psychological propensities more than any other factor or variable could possibly account for economic engagements resulting in the growth of per capita income levels which can primarily be traced to space exploration missions in these two economies as well as others lately. Moreover, no reason or parameter other than psychological sentiments could have inspire or motivate the development of strong and huge industrial military complexes in these advanced economies with its resultant research and development (R&D) effects that impact positively and greatly on growth and development in these countries. One example is the ARPA programme that birthed the Internet in U.S.A. Nations that embark upon space explorations hoped to greatly project their national image in the eyes of the world. The knowledge spillovers emanating from space explorations of the American's NASA for instance generate a wide range of advancement in science as well as research and development (R&D) activities in many other sectors over time.

The advancements in technology that comes with or which is rather associated with space exploration are not only impressive but profound as such inevitably have positive implications on growth and real per capita income levels. What could motivate nations such as U.S.A., Soviet Union (now Russia), U.K., France, China, India, Pakistan, North Korea etc. to produce nuclear warheads and even hydrogen bombs than the national psychological sentiments it generate and project their countries' images in the eyes of the world. They are produced sometimes not necessarily for defending their countries in the case of aggression. The *Manhattan Project* for instance that result in the world's first atomic bomb was built through the marshalling together of eminent scientists for this singular effort by the American government. Though these weapons were used on the Japanese thereby ending

the Second World War, national interest lies at the heart of the project despite opposition by eminent scientists such as Albert Einstein.

Most space missions produce spin-offs in other sectors of a nation's economy whether in engineering, R&D, human capital development. It is imperative to note that the Manhattan project demonstrated explicitly that technological advancement or progress is not an uncontrolled stochastic development. However, quest for new sources of energy and all associated technologies e.g. green energy, biofuels etc. are not likely to be pursued from the perspective or viewpoint of national psychological image because of the global, universal nature and benefits that would emanate from them. Other advanced industrial economies such as the United Kingdom (U.K.), France and Germany were only able to participate on a collaborative European level or platform in partnership with the space missions of both Americans and the Russians (following the demise of the Soviet Union in 1991). The financial resources as well as the technological base and skilled human capital workforce needed for space exploration as earlier mentioned are not only huge but staggering such that it can only be inspired by national pride and psychology by these nations than anything else in the space race. New entrants such as India and China are likewise inspired by this singular factor than anything else. The *raisond'etre* is not far-fetched. What could have inspired or motivated India (though a new global emerging economy with a high level of indigenous technological prowess) with over 270 million of its citizens living in extreme poverty to embark on interplanetary space explorations to Mars - a feat which its neighbor and rival, China is yet to achieved. India has a long history or experience of technology associated with space science and explorations. It developed and launched its first ballistic missile carrying nuclear warhead far back in 1974[22]. There is no doubt that missile technology is closely connected to space exploration. This is purely a technological race as well as a psychological adventure by the Indians to beat the Chinese who have also embark on a manned space mission to the moon.

Now beaming our searchlight on China, also known as *Sinim* in ancient times, we discovered the world most populous country as having a strong national bond that is influenced greatly by psychology closely tied to its roots or origin as a civilized advanced nation dating back to the past five thousand years[23]. Modern China came in to being however in 1949 under the late Chairman Mao Tse Sung after the war of liberation with the nationalists led by General Chiang Kai-Shek who established the breakaway Republic of Taiwan (though Mainland China still sees it as part of its territory). For quite a couple of decades, thereafter China was a sleeping economic giant as the whole country is swept under the influence of the *Great Leap Forward* of 1959 which is not successful and later the *Cultural Revolution* which is aimed at inculcating and instilling a cultural rejuvenation or rightly put, communist ideologies whether of its opposition to the free market *laissez-faire* model or democracy as a political creed on the Chinese people both under Mao. Apparently, the Chinese people have a strong social fabric or structure closely or tightly knitting them together in a sense of national bond fueled by profound psychological considerations that can be traced to their history as nation.

Perhaps the issue of whether the *Cultural Revolution* succeeded in reinforcing this disposition is still a question of serious theoretical and empirical discourse. However, the economic reforms been pursued by the late Chinese leader, Deng Xiaoping in the 1980s – starting from 1984 laid the foundation that actually led to the emergence of the country as the second largest economy only surpassed by the Americans from its position as the 8th largest in the world in the 1980s when those reforms started. The huge industrial complex in China producing all kinds of goods from smartphones to heavy industrial machineries is been made possible by hundreds of millions of semi-skilled and skilled workers from the rural areas of the country who see themselves and their contributions as parts of the continuous growth and prosperity of a strong indivisible China steeped back in history. China's neighbor, Russia also has a sense of national pride dating back to many centuries ago – a psychological viewpoint which is not shared by other nationalities such as the Armenians, the Uzbeks, the Kazakhs etc. that make up the former Soviet Union. The inevitable result then was the '*glasnost*' and the '*perestroika*', developments that led to the demise of the once powerful superpower in 1991[24]. The success story of the economic reforms embarked upon

[22] The former Indian Prime Minister, Indira Gandhi (daughter of former Prime Minister Jawaharlal Nehru) was reported to have said that India would produce nuclear weapons even if it meant it feeding on grass. No one need to be told that such statements which were actually implemented were psychological - in terms of boosting the national 'pride' of India which was facing threats from its neighbour and rival, China on the one hand and Pakistan in particular on the other hand (over the Kashmir crisis) than anything else.

[23] The present name of China is probably derived from the reign of the Ch'in dynasty which completes the conquest of all the separate independent states in this ancient nation under Shih Huang-ti around 221B.C. The *Great Wall* of China was constructed during the reign of this dynasty in 214 B.C. It is interesting to note that the *Great Wall* of China is the only landmark or structure that is visible from the surface of the Moon.

[24] The *glasnost* was a precursor to the *perestroika* as it begins the opening up of the Soviet Union to the outside world and paved the way for the latter which essentially granted all the constituent Soviet Socialist Republics such as Ukraine, Georgia, Turkmenistan etc. independence under the more liberal regime of Mikhail Gorbachev. The advent probably of a similar political

by the Chinese leaders in the 1980s have made Chinese leaders and people –though mainly Communists to be seen as better experts and masters of the capitalist, free enterprise *laissez-faire* model than the Americans and the Europeans from whose nations or continent it actually originated. Better and efficient application and management of any economic model are never the sole attributes or capabilities of any nation or people as what matters most is the correct diagnosis and right application of economic principles and policies anywhere in the world. Having the largest population in the world –despite the demographic policy of one child per couple by the government there, the Chinese people have been able to assert their economic might and power through their enormous industrial and manufacturing production of goods of all kinds that not only find a huge domestic market but also found its way to many developing and emerging nations in Africa, Latin America etc.

The fact that they seems to be good or better managers of resources and economic models is a clear testament of the achievements in terms of economic growth and development that the psychological disposition and collective strength that the citizens of any nation can inspired and mustered towards this end. How the Chinese managed their economy and currency-the *Renminbi* (previously known as *Yuan*) despite criticisms and misgivings by the Americans and the I.M.F. is indeed remarkable. Recently when the currencies of the other global emerging economies that make up the BRIC (Brazil, Russia, India, and China) lost some of their values, only the Chinese *Renminbi* maintained a steady and stable position against the American dollar. These other *R*-currencies that is, the Brazilian *Real*, Russian *Rouble*, and the Indian *Rupee* all lost over ten percent of their values against the dollar. Many American and European policymakers see the *Renminbi* as deliberately been manipulated and undervalued by the Chinese to favour their exports which found ready markets in their economies. This position, though a subject of serious theoretical and applied analysis is by and large a psychological warfare with underlying economic factors or considerations. Economics and psychology sometimes goes hand in hand not only in day to day human activities but also as it concerns the economic policies and management of nations. That psychology as the force behind many productive economic engagements is now very plausible from our analysis so far in this paper. The processes obviously have growth and development implications. The expectations function of citizens from their governments across diverse nations of the world though might seemed similar vis-à-vis hope of good infrastructures, even distribution of wealth etc., there are variations from one country to another. We now proceed to the modelling framework and analysis and thereafter the implications thereof given the theoretical parameterization we have just considered.

4. The Modelling Framework and Analysis

How the psychological parameters of 'patriotism', nationalism or 'national pride or image' has been deployed by various countries of the world in enforcing social cohesion and public commitments towards achieving better per capita income levels is a complex issue and possibly inexhaustive. Much more need to be put in perspective to understand and address these issues. We have only been able to identify and possibly draw attention to one of the fundamental considerations underlying not only the economic behaviour of nations or nation-states, but also the whole gamut of productive economic engagements and hence increased per capita income levels. How these aforementioned psychological forces stimulate a system of incentives, rewards and sanctions directly or indirectly on the economic superstructure with concomitant effects on the living standards. It is also possible that extensive research can unearth better and vital insights in to how economic systems are motivated and influenced in diverse nations across the world. It is well-known that expectations by citizens of a country whether as producers or consumers could most probably account for the somewhat sudden swings in macroeconomic activity resulting inevitably in business cycles scenarios. These possibilities are fostered in an atmosphere of optimism and sometimes pessimism, most often than not in disproportionate dimensions. We have tried to isolate this particular or specific role of psychology in promoting or inhibiting economic growth and development revealed in the pattern of per capita incomes distribution globally without incorporating other aspects such as monetary or financial matters because attempts of this nature entails theoretical abstraction and simplification.

Much more important however is the fact that one cannot theorize about everything at a point in time. There are no kits and instruments whether theoretical or empirical to undertake such an adventure in economic science anyway. Real per capita income level would be modelled as the dependent variable, while the psychological parameters or variables such as 'patriotism', 'national expectation' and nationalism were considered or modelled as the independent variables in our model. The mechanics of how to account for the psychological underpinnings of economic behaviour in different nations and consequent effects on per capita income levels though a complex exercise we would approach in this section through theoretical abstraction and simplification.

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outcome in the People's Republic of China especially the emergence of a leader in the mold of Mikhail Gorbachev as well as prelude processes such as the *glasnost* and *perestroika* in the former Soviet Union happening in the communist party of this great Oriental nation in the sense of introducing political liberalism is certainly a question in the womb of time.

As all theoretical modelling begin with abstraction and simplification, we would start by considering the basic premises or assumptions of the model. Later we would explore the hypothesis and deduct or infer some 'heuristic' implications of this model from the analysis. In any given country n, for instance, the psychological expectations of its citizens as rational optimizing economic agents are summed up in a sort of unique nationalistic 'utility maximizing function' that had implications on changes in real per capita incomes both in the medium and long term horizons. Economic agents whether individuals and households as well as firms do certainly have saving propensities which might later are transformed in to investments in the course of economic engagements in the macroeconomy. Having noted that, it is expedient to stress that their investment and saving behaviour and function are influenced fundamentally by their own personal economic considerations as well as the psychological expectations towards the growth and development of their country which conferred on them the enabling environment and avenue for their optimal development within the wider global economy which obviously calls for consideration[25].

We would now consider a framework for modelling the psychological parameters that most probably underlies economic activity and engagements in most modern economies. For a hypothetical economy, *Lalupon*, with a finite number of citizens (n_1, n_2, n_3,….N) with their individual utility functions (u_1, u_2, u_3,……u_N), then the patriotic or nationalistic psychological expectations of its citizens (hereafter to be referred to as *Laluponians*) is the sum total of the individual utility functions multiplied by the factor Φ which stands for the aggregate saving and investment function of these agents as it relates to or implied growth and development of such economy. Exchange is assumed to involve only goods-for-goods in contrast with what obtain in a modern monetary economy. This theoretical abstraction is meant only as an analytical simplification. By summing the changes in the behaviour of individuals as *optimizing* agents as the economic environment changes, we can derive the movements of national magnitudes. Therefore

$$N_E = \sum_{i=1}^{N} u_N \,.\Phi \qquad (1)$$

where: N_E is the national, psychological expectations of Laluponians, $\sum_{i=1}^{N} u_N$ is the sum total of the individual utility functions (and as such the social utility function) while Φ designate the aggregate saving and investment function of Laluponians in relation to the growth and development of their nation.

It is imperative to stress that the central underlying assumption of this theory is that *self-interest* (which lies at the heart of all economic activity) in individuals as rational optimizing agents in their expectations and aspirations from their government is then mapped in to the national 'patriotic' stance of such government in exercising the apparatus of power or sovereignty vis-à-vis public policy towards achieving overall national interests which inevitably has effects on output growth and economic development in such a hypothetical economy[26]. So many psychological factors are there that either make or mar economic activity in many nations in the course of their economic growth and development. Some includes morale of its labour force and citizens, cultural attitudes, as well as incentives and sanctions through public policy are capable of reinforcing economic development generally. Leaders and those in authority in such nations perceive their ability to correctly read the moods, feelings as well as expectations and aspirations of their citizens and then adequately *mapped* them in to the nation's psychological function as been *sine qua non* to their political survival and relevance.

Citizens in democratic economies revealed their frustrations or reactions to economic policies and governance through the instrumentality of the ballot box and voting rights. Where the macroeconomic policies are good and stable, the electorates ensure the continuity of governments by both re-election and mass public support while where they are otherwise; the citizens vote them out to foster the continous corporate existence of such

[25] Expectations by citizens of a country from their membership of such nations sometimes exceed the possibilities of fulfillment even as much as demands on resources tend to exceed supply. Nevertheless, motivations and incentives inherently implicit in the patriotic stance of many nations would not only add to a nation's capital stock (both tangible and intangible) through more positive contributions but also help improve growth and development of such countries ultimately.

[26] Patriotism have in recent times play a major role in strategic international geopolitics for instance in the case of Russia which banned foods and agricultural commodities from U.S. and other EU countries that imposed sanctions on it following the crisis involving the Ukrainian government and the rebels in the eastern part of the country. That is a good and classic evidence of psychology playing critical or fundamental role in economic activity and engagements even at the international level. That action by Russia might probably help the entrepreneurs and agricultural firms there to take advantage of this ban to secure market shares and produce those commodities or their substitutes to offset the effects of the ban. How that translates to better per capita income levels however remain to be seen. Patriotism also plays a considerable psychological influence not just on the industrial and manufacturing sectors of advanced economies such as U.S., Japan, Germany but also the national consciousness and 'national image' of such nations. Industrial products and their brands such as the Ford, General Motors and General Electric in the United States; Toyota, Sony, Toshiba, Mitsubishi and Honda in Japan; Mercedes Benz in Germany; Reynolds in France; Nokia in Finland; Phillips in the Netherlands; Tata in India; Dangote in Nigeria; Samsung and Daewoo in South Korea etc. These products and brands no doubt inspired a sense of 'patriotism' in those countries.

democracies. In centrally planned economies however, the scenario is quite different as the issues of governance are controlled by certain set or group of leaders of the communist party in power – the Politburo, the leader sometimes tending to be dictatorial. Nevertheless, satisfactions by citizens with the governance model and macroeconomic policies of any government in democratic economies are most probably revealed by public polls such as those conducted by organizations like the *Gallup* in the United States[27].

Good macroeconomic policies would breed a positive atmosphere of optimism (and by extension productive economic engagements) in any economy not only in periods of boom but also in times of recessions though the matrix of economic policy mix is such that one policy direction most often than not produces conflicting outcomes or trade-offs. An example that would suffice is the psychological atmosphere that pervades the post *Great Depression* era of the 1930s, the boom era of the 1990s and the aftermath of the 2007 global economic crisis on the U.S. economy. The irony however is that where economics and politics meet and converge, psychological considerations lie at the heart of whatever outcomes ultimately evolved from such interactions especially in matters involving national economies. This is more true in the formation of nation-states which is never an extinct process as new nations are still been established in recent times.[28] The premium that a country placed on its human capital base or endowment is another interesting dimension and is informed by the level of investment in this vital sector of the economy over time and this has obvious implications[29]. Now we can extend our analysis to consider that the psychological image of *Lalupon* (as a nation) is the sum total of the utility functions of the expectations of Laluponians in regard to their government and country. To this end, assuming the country with N number of citizens has its psychological image defined as:

$$U = \sum_{i=1}^{N} U(E_i), \quad U'(E_i) > 0, U''(E_i) < 0 \qquad (2)$$

where: E is the level of expectation of Laluponians.

Moreover, since the level of expectation uniquely determines its marginal utility, the level of psychological expectation is equal across and or among all citizens of this hypothetical country, hence: $E_1 = E_2 = \ldots E_N$. This is a fundamental requirement for optimization. Let us extend our argument to a two-country world comprising nations hypothetically referred to as *Lalupon* and *Isokan* (which as designated as N_1 and N_2 respectively) with a distinct psychological image in each nation and beyond[30]. *Isokan* has its aggregative psychological image or social utility function defined as:

$$\psi = \sum_{i=1}^{N} (\varphi) \qquad (3)$$

where: φ is the national psychological expectations of Laluponians which is N_E in (1).

In other words, the psychological expectation of the latter is a function of the expectation regime that is operative in the former. For theoretical flexibility, trade considerations are only on a bilateral level since we initially assumed a two nations global model. The national psychological expectations function is a function of the various parameters earlier considered *e.g.* space exploration, nationalism or nationalization, sport and 'national coercion', technological research etc. There are two kinds of psychological image atmosphere operative in each particular

[27] Sometimes, citizens vent their frustrations for instance to income inequality and unfavourable macroeconomic policies and climates through mass protests and demonstrations. In recent times such protests include those by the Tea Party in the States and civil protests by the Occupy Campaign Group at St. Paul's Cathedral, London in the U.K.

[28] The examples include South Sudan which became an independent sovereign state in 2011. Scotland by a marginally but highly significant ten percent margin rejected the possibility of becoming the newest nation on the planet. Economic issues tied to strong psychological considerations lie at the heart of the agitation and attainment of nationhood – presence of rich oil fields is highly linked or connected to the creation of the former aside legitimate grievances of political oppression and repression in the erstwhile old Republic of Sudan. Civil war has ravaged this young or 'infant' nation since December 2013. The same reason suffices for the latter in its quest to attain independence from the United Kingdom especially the rich oil fields in the North Sea. The psychological underpinning of the formation of nations essentially centred on the strong feelings, attachments, expectations as well as a high level or sense of national identity to such developments. Economic arguments and intense psychological emotions did not eventually translate in to political independence for Scotland – the country of nativity of the supposed father of modern economics, Adam Smith.

[29] The rationale in recent times for instance in the exchange of an Israeli soldier for one thousand Palestinian prisoners obviously revealed the premium that different countries placed on their human capital. A country where its human capital represents its very survival and essence is very much understandable like in the case of Israel today. Likewise remarkable is the case of one American soldier exchange for five prominent prisoners detained at Guantanamo base by the United States following the September 11, 2001 attack on the World Trade Centre in New York.

[30] This is only true of a global environment with politically separate nations. The possibilities evident from a borderless global economy where there are no separate nations and therefore no distinct nationalism or nationalistic traits can only be imagined. Psychological considerations engendered by economic competition would not exist.

country, that is, old (*Lalupon*) and new (*Isokan*). At any point in time, β_0 of the global psychological image is old (*Lalupon*'s image) and $\beta_n = \beta - \beta_0$ is the new (*Isokan*'s image) in the context of the two-nation world (where β implied the global psychological image). The motivation or psychology behind growth and development is assumed equal across the borders and frontiers of these nations. The motivation or psychological atmosphere for profound output growth and increase in per capita income levels is however so pervasive in N_1 but lacking in N_2. This is analogous to country A and B in the hypothetical global economy model considered in Section 3. Moreover, it takes one unit of some reinforcing mechanism in *Lalupon* (*e.g.* sport) to produce one unit increment in its national psychological image. Nevertheless, psychological expectations whether old (*Laluponian*) or new (*Isokanian*) are produced under perfect competition. We normalize the cost of the old psychological image to 1, and also define the cost of creating or producing the new psychological image as C_n - that is, C_0 =1. In order to create a new psychological image for Isokan in the eyes of the rest of the world, a kind of rebranding was embarked upon and the cost of such endeavour is given as:

$$C_i(\mu) = \frac{c_i \mu}{(1-\mu)} \quad (4)$$

Where μ>0 is a constant. As we have noted earlier on, we are considering a two-country world (N_1 and N_2) each with a distinct psychological image perceived and expressed in the country and abroad. At time t, there are $N_i(t)$ persons, engaged in productive endeavours in country i ($i = 1,2$) with psychological effect or implication on economic growth and development. The exogenously given rate of growth of $N_i(t)$ is δ. Real, *per capita* expectation or disposition (in terms of psychological propensity or drive) is a stream, P(t), t≥0, of units of a single good –national image or 'pride'. Country i has its national aggregative psychological image (utility function) represented as the present discounted value of a stream of instantaneous psychic utility given as:

$$\int_0^\infty u[P(t)] \cdot e^{-\rho t} \cdot N_i(t)dt \quad (5)$$

Where the discount rate, ρ>0. Production per capita of the only one good is divided in to consumption, or per capita expectation, P(t) and national psychological capital (national esteem or pride) accumulation. If we let $E_i(t)$ denote the total stock of country i's national pride or psychological disposition, and $\dot{E}_i(t)$ as its rate of change infinitesimally, then the nation's total psychological image is $N_i(t)P(t)+\dot{E}_i(t)$. The variable, $\dot{E}_i(t)$ is the net investment in building up the country's psychological image. Production depends on the levels of the sum total of individual utility functions represented by (3) and aggregate saving and investment function of citizens (Φ)as well as on the level A(t) of 'technical progress' (in national psychological rebranding cum ego boosting anyway!), according to:

$$N_i(t)P(t)+\dot{E}_i(t) = A(t).\delta.\Phi \quad (6)$$

Where the exogenously given rate of technical change, Ȧ/A, is β>0. The aggregate saving and investment functions should be thought of here as all productive engagements by citizens of a country that help in building the national pride or esteem of the nation or reinforcing them[31]. This dependence reflects the state of technology or knowledge at any given point in time. The national image perceptive allocation problem faced by this nation i in the dual-country global economy is fundamentally to choose an optimal time path, P(t) in terms of per capita expectation. Though we are dealing with an intangible good-*psychological esteem* or *image* in the study, the treatment of these goods and other related parameters in such a theoretical model like this one is to simplify the analysis of the issues and considerations involved. Now, the main postulate in terms of optimal expectation-psychological expectations by citizens of country i that maximize utility (5) subject to the state of knowledge (6) is the *Hamiltonian* H defined by

$$H(E, \mu, P, t) = e^{-\rho t}P(t)N_i(t) + \mu(A(t)E(t)\Phi - N_iP) \quad (7)$$

Which is basically the sum of the felicity function and from (6) the *Lagrangian* multiplier times the right hand side of the transition equation. The constraints to the development of a national psyche with implications on growth and development include a nation's historical antecedents, plurality or diversity of cultures or worldviews, corruption, social vices or maladies etc. The primal place of this approach in dynamic optimization is most assured. Now the first order conditions are:

$$H_P = e^{-\rho t}N_i(t) - N_i(t)\mu = 0 \quad (8)$$

As well as:

$$H_\mu = A(t)E(t)\Phi - N_i(t)P(t) = 0 \quad (9)$$

[31] This most probably leads to or rather result in specialized human capital accumulation on an economy-wide scale.

Which implies that :

$$N_i(t)P(t) = A(t)E(t) \quad (10)$$

An optimal expectation must maximize the Hamiltonian H at any time t, provided the Lagrangian μ(t) is correctly specified. The transversality condition is satisfied as:

$$\lim_{t\to\infty} e^{-\rho t}\mu(t)E(t) = 0 \quad (11)$$

Which is the optimal path. This is a direct application of the Pontryagin's *Maximum Principle*. The implication of (11) is that the value of the national psychological disposition, E(t) must be asymptotically zero. Hence, at the point where the psychological propensity is buoyantly highest for a country in its development path, the return on its aggregate human capital investment is at its optimal level, *ceteris paribus*. When the returns on human capital investments are optimal, output growth in terms of the productivity levels of effective workers is at its most efficient or maximum level. How that translates in to higher per capita income level for majority of the citizenry is a function of the income distribution system and the mechanisms in place for such in our hypothetical economy.

So many effects or implications emanating from the actions of these psychological forces or influences on economic activity and engagements and hence per capita income levels include a high level of morale among the labour force in each of these countries thereby identifying with the objective of such nation-states, more robust economic performance, high perception of the nation's image in the international community, internal stability and cohesion. It is expedient to note that inasmuch as psychological considerations drive the output growth to some extent in diverse countries, *economifugal* forces or influences make resources to go out of the economy in a sort of exogenous nature. In other words, exogenous forces influence economic activity and technology as expounded by neoclassical growth theory.

The theory so far considered provides an account of how underlying psychological considerations have possibly explained economic behaviour globally and how these has led to tremendous diversity in per capita income levels across the countries of the world. As the methodology employed involved abstraction and simplification of the issues, whether the model and the theory explored contained complete and well-validated theoretical constructs is not for us to ascertain but we would rather left that to posterity to assess and judged.

Concluding Remarks

We have so far examined a theoretical exposition of the underlying psychological basis of economic growth and development of nations within the context of a simple parameterization and modelling framework. However, constructing or developing a comparative metric system in measuring how 'patriotic' a country and its citizens are to productive economic engagements and national issues relative to another and how all of that would account for differences in income levels is a herculean, if not impossible task. Moreso, a rapid convergence in per capita income levels of different economies to a common level globally arising from more intensive psychological dispositions in terms of 'national image or pride' promotion in many countries is probably only a theoretical possibility. Nevertheless, so many issues and factors are involved in variations and changes in real per capita income levels in different countries across the globe that hitherto the motivating force or basis behind them has been ignored or somewhat unexplored. This is what this paper fundamentally identified and addressed in accounting for the pattern for those profound growth and increased per capita income levels of diverse nations of the world over time. Moreover, what is generally observed or inferred from this theory is that psychology (in terms of "national pride") more than any other variable inspired and motivate many growth and development initiatives, for instance space exploration in many countries across the globe and these are closely tied to economic considerations. This is true in many cases as the exploration of space especially the putting the first man in space and on the moon as well as the American ARPA Project which is the precursor to the Internet etc. Though the paper appeared to hypothesize a sort of psychological model of economic growth and development, it is merely an attempt in accounting for the growth and development experiences of diverse nations across the world from the theoretical standpoint of their underlying psychological considerations. Moreover is the fact that the main underlying psychological factors or considerations in most economic activity in both developed and developing economies might not possibly be explained in a few parameters as we have undertaken in the paper. We only hope that we have been able to elicit one of those fundamental issues hitherto unexplored in theoretical economics.

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RELATIONSHIP BETWEEN CREATIVITY, BUSINESS NETWORK AND INDEPENDENCE IN ENTREPRENEURSHIP OF ACEH YOUTH

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Abstract:

The purpose of this study was to determine the effect of creativity, business Networks and entrepreneurial independence among young people in Aceh. The location of this study was conducted on young and medium-sized business actors in Aceh, the sampling method used non-probability sampling method with purposive sampling technique so that the number of respondents obtained were 170 young entrepreneurs in Aceh. The analytical tool used is Structural Equation Modeling in the model and testing hypotheses and testing a series of relatively complex relationships simultaneously. The results showed that creativity support, business network support, and independence support had a significant influence on entrepreneurship among young people in Aceh. From the results of this study it can be seen that each indicator that forms a latent variable shows the results that meet the criteria, namely the CR value above 1.96 with P-value that is smaller than 0.05.

Keywords: creativity, business network, independence support, entrepreneurship.

JEL Classification: L14; L26; C12.

Introduction

Indonesia is seen as the highest market potential for the industrial world. In addition, if the management and development of skills are carried out, Indonesian human resources will be a great force for the country's development and bargaining in the eyes of the world. Therefore, there are many opportunities for Indonesian youth to start business and develop it. To empower Indonesian youth to be able to advance, independent and equal to other developed countries, we need to build youth intellectuality with the development of science and technology, secondly, fortify young people with a high religious base, and thirdly, build the sensitivity of entrepreneurship among youth. The purpose of sensitivity here is how young people must become people who are progressing for their future. Youth independence can be achieved by building an entrepreneurial spirit.

- Entrepreneurship is an ability of a person on finding business opportunities and able to decide good action to execute the opportunities. Entrepreneurial activity strongly supports the creation of a prosperous state in terms of the economy. But in reality until present, only a small number of Indonesians have become entrepreneurs. As evidenced by 265 million Indonesian citizens, only 7.95 million are entrepreneurs (economy.okezone.com, 2018).
- The number of entrepreneurs in Indonesia, which only reaches 3% percent of Indonesia's current total population of 265, is still very low compared to developed countries in the world that have high economic growth rates. Compare it with countries in Asia, the percentage of Singaporeans who have entrepreneurship reaches 7 percent, Malaysia reaches 5 percent, while China and Japan reach 10 percent. This is still lower compared to the entrepreneurs of the United States, which reached 11.5-12 percent. (BPS, 2018).
- Aceh is one of the provinces in the westernmost region in Indonesia, currently the number of entrepreneurs in Aceh in 2018 is around 57,000 people from 5.19 million people of Aceh. The number of entrepreneurs in Aceh is still very small, whereas entrepreneurs as an economic driving force are needed to boost Aceh's economic growth.
- In order in enhancing the number of Acehnese entrepreneurs, the youth in Aceh become one of the main drivers in increasing entrepreneurial growth, for that young people in Aceh need to have creativity, business Networks, and peace so that they can compete and the products they produce can be accepted in the market.

1. Literature Review

1.1. Entrepreneurship

Entrepreneurship is "the attempt to create value through recognition of business opportunities, the management of risk-taking appropriate to the opportunity and through the communicative and management skills to mobilize human resources, financial and material resources to bring a project fruition". Hisrich and Sheperd (2010, 6) added, "entrepreneurship is the value of devoting the necessary time and effort; assuming the accompanying financial, psychic and social risks and uncertainties; and receiving the resulting rewards of monetary and personal satisfaction. So the task as an entrepreneur is to see opportunities, control human resources and natural resources to achieve goals and change existing opportunities into tangible things (Wan dan, Hui-Ying Hsu 2010).

1.2. Creativity Support

Handkle (2004) suggests that content creativity can be understood as a special case of innovation, but it cannot cover all innovative activities in the creative industry. The importance of the creation of ideas, does not distinguish the creative industry in absolute terms from other economic sectors carried out by conducting a benchmarking approach to determine its various characteristics. By deciphering the relationship between basic concepts, and measuring innovation in cultural industries. Furthermore, the two main challenges appear to be a common feature in the creative industry and the alleged duality of the creative industry where the general, social and economic conditions of technology are different from cultural factors, namely creativity or ideas (María *et al.* 2017).

1.3. Business Network Support

Business business Networks specialize in business Networks that synergize people, either individuals or entities who are entrepreneurs or entrepreneurs. The purpose of this synergy is to implement various programs. Business business Networks are the process of building mutually beneficial relationships with other entrepreneurs and potential clients and / or customers. This definition does not say anything about people meeting; the ever-increasing incidence of killing network businesses meeting-and-greeting has given a bad name to the business network. The purpose of a business network is to increase business income - one way or another. Thickening of the bottom line can be immediately obvious, such as in developing relationships with new clients, or developing over time, because in learning new business skills (Jelke 2006).

Entrepreneurial business Networks are network ties that connect actors with various businesses such as business partners, friends, agents, mentors to get the resources needed for example, information, money, moral support from network operators. (Greogre and Wood 2001). This study uses 5 indicators, namely social networking or good relations with family, friends, acquaintances, entrepreneurs and activists. So that it gets information and support, supporting business Networks such as agents, banking, government, universities, litmas, networking between companies.

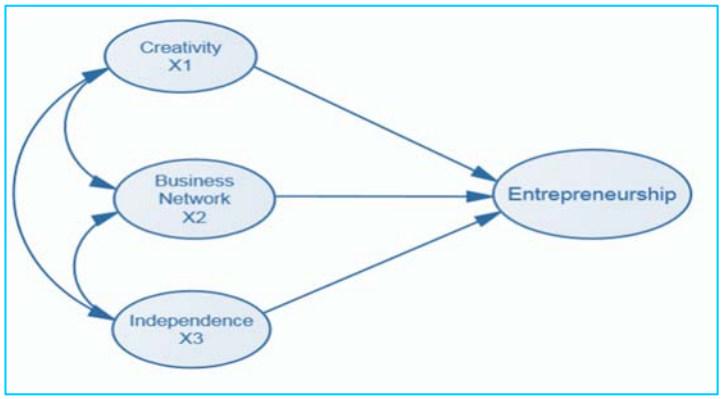
1.4. Independence Support

Independence support is someone's support for living with an independent business not dependent on others. Independence is a self-effort that covers all aspects of needs that can be fulfilled alone without having to depend on others (Mitra, dan. Abubakar, Sagagi 2011). Entrepreneurs usually start their business independently with their own capital or joint capital. This independence is the initial capital of creating a healthy corporate economy (Suna dan, Gartner 2017).

1.5. Research Framework

To clarify the relationship between these variables, a paradigm is presented (relationship model) that is adapted to the situation in entrepreneurship in youth in Aceh, and then becomes the framework of thought in this study, as follows:

Figure 1. Research Framework



1.6. Research Hypothesis

The hypothesis in the study is divided into two, as follows:

- $H_{a1:}$ There is an influence of creativity, business business Networks, and independence influential on youth entrepreneurship in Aceh;
- $H_{a2:}$ There is an influence of creativity influencing youth entrepreneurship in Aceh;
- $H_{a3:}$ There is an influence of business business Networks influencing youth entrepreneurship in Aceh;
- $H_{a4:}$ There is a independence influence on youth entrepreneurship in Aceh

2. Analytical Method

The population set in this study is all young people who have a small and medium scale business in Aceh. In this study the sampling method uses non-probability sampling method as well as sampling techniques used using purposive sampling technique, where the sample is Acehnese youth who have started a business and are willing to provide information.

In data collection, this study uses a questionnaire consisting of questions items distributed to youth in Aceh who have businesses, according to the variables studied. To measure variables, this study uses a Likert scale interval based on five ranges. Likert scale can be used to measure items of statements that are positive or negative to the problem under study. Questions in the questionnaire were tested using 1-5 Likert scales. Data analysis is a process of analysing data into certain a form to make easier to read and to use. In this study the method chosen in analysing the data must be in appropriate with the research pattern and the variables to be studied. To analyse the data used Structural Equation Modulation (SEM) from the AMOS 22.0 statistical software package in the model and hypotheses assessment. The SEM equation model is a set of statistical techniques that allow testing of a series of relatively complex relationships simultaneously (Ferdinand 2014, 181). The SEM model in accordance with the frame of mind described in the following formulation:

$$\eta = \gamma 1.1\xi 1 + \gamma 1.2\ \xi 2 + \gamma 1.3\ \xi 3 + \zeta \qquad (1)$$

where: η - exogenous latent variable; ξ - endogenous latent variable; γ - the magnitude of the effect of endogenous latent variables on exogenous latent variables; ζ - the magnitude of the error vector in the structural relationship between variables

2.1. Hypothesis testing

After the model meets the requirements, then the next thing to do is regression weight /loading factor. This test is carried out similar to the t test for regression weight/loading factor/model coefficient). Hypothesis testing is carried out using a significant value (P-value) at the 0.05 level of significance.

3. Research Result

3.1. Validity and Reliability Test Results

Table 1. Validity Test Results

			Estimate
CR1	<---	Creativity_X1	,637
CR2	<---	Creativity_X1	,780
CR3	<---	Creativity_X1	,652
CR4	<---	Creativity_X1	,681
CR5	<---	Creativity_X1	,692
NT5	<---	Bussiness Networks_X2	,802
NT4	<---	Bussiness Networks_X2	,909
NT3	<---	Bussiness Networks_X2	,746
NT2	<---	Bussiness Networks_X2	,844
NT1	<---	Bussiness Networks_X2	,643
MO1	<---	Independence_X3	,746
MO2	<---	Independence_X3	,662
MO3	<---	Independence_X3	,713
MO4	<---	Independence_X3	,729
MO5	<---	Independence_X3	,631
ENT1	<---	Entrepreneurship	,701
ENT2	<---	Entrepreneurship	,819
ENT3	<---	Entrepreneurship	,831
ENT5	<---	Entrepreneurship	,693

Estimate value of each indicator in this study after modification (drop out) obtained the Loading Factor value for each indicator> 0.5. Thus it can be concluded that the data in this study are valid.

Table 2. Reliability Test Results

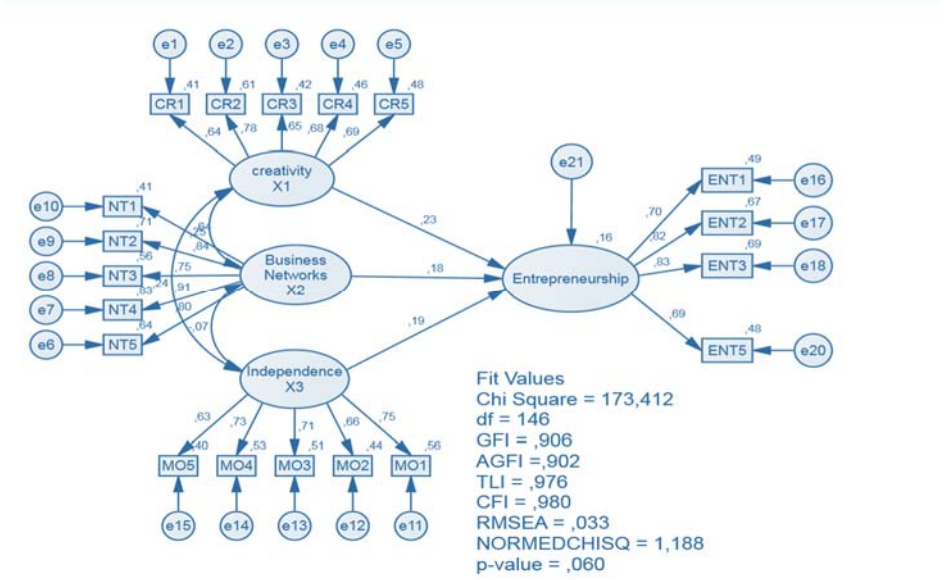
No	Variable	Construct Reliability		Variance Extracted		Conclusion
		Value Cut Off	Value Acquisition	Value Cut Off	Value Acquisition	
1	Creativity	0,70	0,73	0,50	0,53	Reliable
2	Business Network	0,70	0,85	0,50	0,71	Reliable
3	Independence	0,70	0,74	0,50	0,55	Reliable
4	Entrepreneurship	0,70	0,76	0,50	0,58	Reliable

Based on the data in Table 2 above shows that all Construct Reliability and Variance Extracted in this research model have good reliability and convergent values, so the model can be processed for the next stage.

3.2. Model Measurement Test

The following shows the relationship between indicators and unobserved Variables in the Measurement Model, in the following table shows the relationship between indicators and their respective constructs. Loading factor is used to measure the contribution of each indicator if the value is above 0.6, then the indicator is said to be representative enough to explain the unobserved variable (Ferdinand 2014). Therefore this indicator must be included in subsequent data processing. As after the measurement model is analysed through confirmatory factor analysis and it is seen that each indicator can be used to define a latent construct, a full SEM model can be analysed.

Figure 2. Research Model Test Results



3.3. Structural Equation Modelling Analysis

The next analysis is the Full Model Structural Equation Model (SEM) analysis which is intended to test the models and hypotheses developed in this study. Model testing in Structural Equation Model is carried out with two tests, namely the suitability of the model and test the significance of causality through the estimation coefficient test.

Table 3. Regression Weight
Direct Influence of Estimate Standardized

			EstimateStandardized	S.E.	C.R.	P
Entrepreneurship	<---	Creativity_X1	0,233	,100	2,359	,018
Entrepreneurship	<---	Bussiness Networks_X2	0,184	,063	2,094	,036
Entrepreneurship	<---	Independence_X3	0,188	,090	2,033	,042
Entrepreneurship	<---	Creativity_X1	0,233	,100	2,359	,018

Based on Table 3 above shows that each latent Variable forming indicator shows results that meet the criteria, namely the CR value above 1.96 with P smaller than 0.05, unless there are some p values greater than 0.05. The result can be said that the indicator of the forming indicator. The latent variable is significantly an indicator of the latent factors formed. Thus, the model used in this study is acceptable.

Table 4. Goodness of Fit Indexes Full Model

Goodness of Fit Index	Cut-off Value	Analysis Results	Model
χ2 Chi-Square Statistik	Small is expected	173,412	*Goodness of Fit*
Probability	>0,05	0,060	*Goodness of Fit*
CMIN/DF	<2.00	1,188	*Goodness of Fit*
GFI	>0.90	0,906	*Goodness of Fit*
AGFI	>0.90	0,902	*Goodness of Fit*
TLI	>0.95	0,976	*Goodness of Fit*
CFI	>0.95	0,980	*Goodness of Fit*
RMSEA	<0.08	0,033	*Goodness of Fit*

From the evaluation of the Goodness of Fit, it can be summarized as Table 4. It can be seen that in general, using the goodness of fit test, it can be concluded that the existing model meets the criteria of fit. So that output from this model can be made as a finding or research finding related to the relationship between indicators and their respective constructs.

3.4. Research Hypothesis

Based on theoretical discussed above The research hypothesis of this study is analyzing the value of Critical Ratio (CR) and Probability value (P) of the results of the data processing, compared to the required statistical limits, which are above 1.96 for the CR value and below 0.05 for the P value (probability). If the result of the data shows the value that meets these requirements, the proposed research hypothesis can be accepted. In detail the testing of the research hypothesis will be discussed in stages in accordance with the hypothesis that has been proposed.

3.5. Effect of Creativity, Business Network and Independence on Entrepreneurship in Aceh Youth

The development of the results of the hypothesis is carried out in this study relating to the influence of creativity, business networks and independence towards Entrepreneurship in Aceh Youth as follows:

There is influence of creativity Variable (X1) on dependent variable entrepreneurship (Y), as for the level of influence between prices on Entrepreneurship is 0.233 (every time there is creativity will lead to increased entrepreneurship). Thus for Ha1 which states that creativity has a significant effect on entrepreneurship, the youth in Aceh can be accepted.

There is an influence between the independent variable business network (X2) on the dependent variable entrepreneurship (Y), while the magnitude of the level of influence between business networks on entrepreneurship is 0.184 (every improvement in business networks will lead to increased entrepreneurship). Thus Ha2 which states that the network has a significant influence on entrepreneurship for Acehnese youth can be accepted.

There is an influence between independent variables of independence (X3) on dependent variable entrepreneurship (Y), as for the level of influence between Kemadirian on entrepreneurship worth 0.184 (every improvement in independence will lead to increased entrepreneurship). Thus Ha3, which stated that Kemadirian had a significant influence on entrepreneurship among Acehnese youth, was acceptable.

Of the three Variables of the Sapidity Support of Entrepreneurship of Aceh Youth it is known that Creativity has a more dominant influence on Entrepreneurship of Aceh Youth.

Conclusion

1. Entrepreneurship of young people in Aceh is significantly influenced by the creative support of the Acehnese Youth.
2. Entrepreneurship of young people in Aceh is significantly influenced by the support of the Aceh Youth business network.
3. Entrepreneurship for young people in Aceh is significantly influenced by the support of the independence of the Acehnese Youth.

Recommendation

Following are suggestions for Acehnese youth in order to increase entrepreneurship as follows.

1. The creative support for Acehnese youth is one of the factors that have the most influence among other variables in this study, the related parties should pay attention to this variable because creativity can increase the confidence in the entrepreneurship of the youth in Aceh
2. To improve entrepreneurship for young people in Aceh, they should also pay attention to the support of business networks of current business actors and also support the independence of the youth themselves, thus entrepreneurship will grow more for the youth in Aceh.

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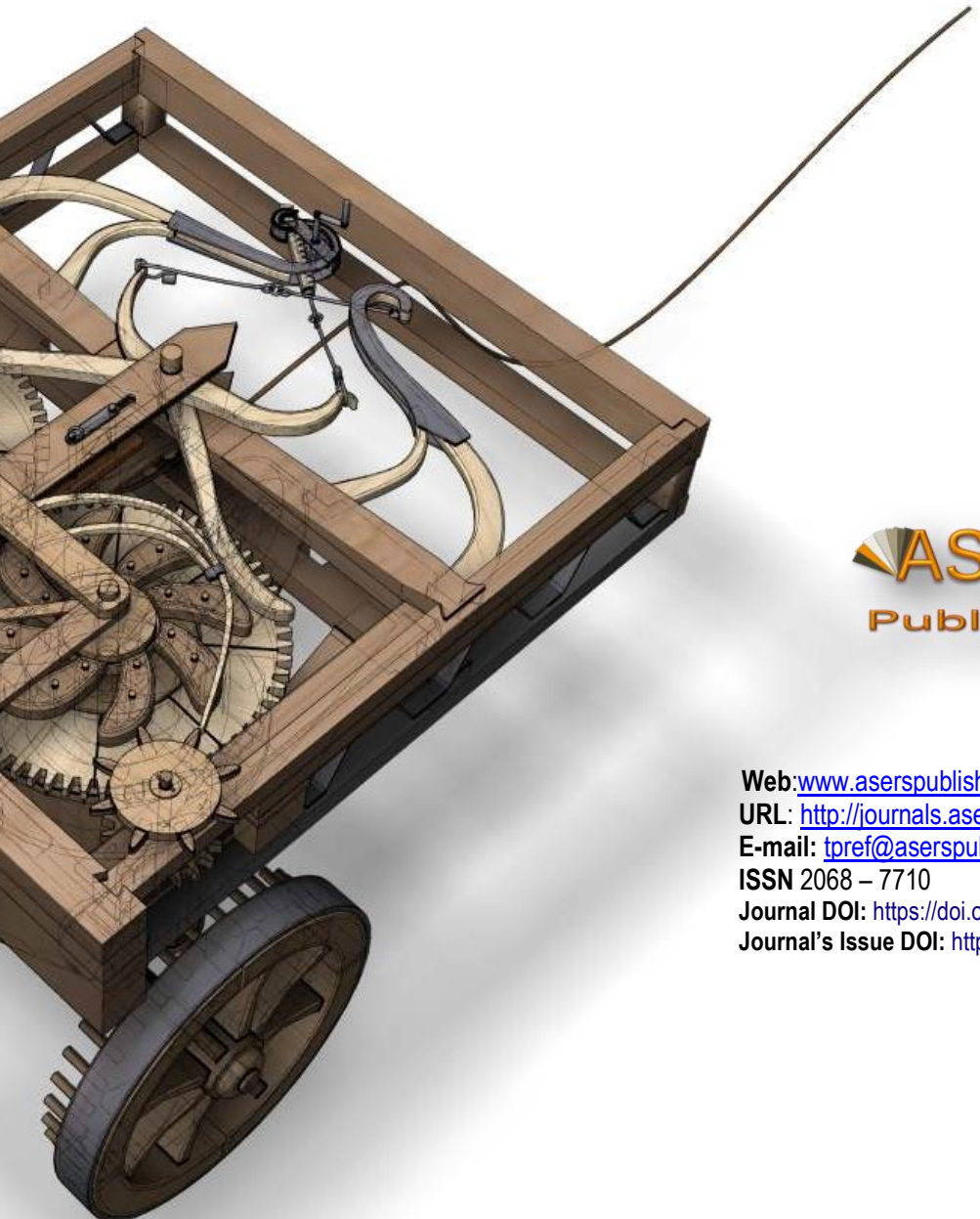

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