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**INVITED ARTICLE**

# Population and steady-state economy in Plato and Aristotle

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## Abstract

*The basic ideas of the modern steady-state economy model can be found in the writings of the two major ancient Greek philosophers, Plato and Aristotle. Plato in his Laws and Aristotle in his Politics discuss the optimal relationship between population and available land that would give enough wealth to the city and allow the citizens to enjoy the best life. They discuss questions of income inequality and approaches to population control. The guiding thought in these models is what the two philosophers define as the 'best life'.*

**Keywords:** Aristotle, Plato, Steady-state Economy, Population

## Introduction

Some of the underlying ideas of the modern steady-state economy model are to be found in the writings of the two major ancient philosophers, namely Plato and Aristotle. The important question on which the development of the Platonic and Aristotelian philosophies was based had been stated by Socrates and it was a simple one: how should we live?

Before Socrates, philosophy was mostly associated with Mathematics (Pythagoras and Zeno of Elea) and Physics (Heraclitus and Democritus). However, after

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Socrates, all schools of philosophy attempted to provide an answer to the question of how we should live and philosophy thus became synonymous with ethics. The teachings of the Cynics, the Stoics, the Epicureans and, of course, Plato and Aristotle are all concerned to a great extent with Ethics. One characteristic that distinguishes Plato and Aristotle from the other ancient philosophers is that their ethical teachings concern not only the moral behaviour of individuals, but are also embedded in models concerning the ideal organisation of society.

As a background to what follows, it should be noted that the code of values for most philosophers, and more so for Plato and Aristotle, gave priority to individual moral behaviour, respect and obedience to the laws of the city, and social justice. Social justice, particularly in the distribution of income and wealth, was considered a precondition for social harmony. Of course, Plato's and Aristotle's ideas were not developed in an intellectual vacuum but in the context of concern with the growing population and fear that an imbalance would develop between the size of the population and availability of land. The population of Greece itself is estimated to have grown to three million by the second half of the fifth century BC, just before the Peloponnesian War (Feen, 1996); but colonisation of the Mediterranean from the eighth century BC had increased Greek controlled territory.

Indeed, pressure on resources due to population growth had become evident as early as the time of Homer (8<sup>th</sup> century BC). In a lost hymn (Homer [trans. Evelyne-White], 1920: 'The Cypria', fragment 3), the poet attributes the Trojan War to overpopulation. He sings:

There was a time when the countless tribe of men, though wide dispersed, oppressed the surface of the deep-bosomed earth, and Zeus saw it and had pity and in his wise heart resolved to relieve the all-nurturing earth of men by causing the great struggle of the Ilian war, that the load of death might empty the world. And so the heroes were slain in Troy and the plan of Zeus came to pass.

### **What is a steady-state economy?**

To compare the models of Plato and Aristotle with the modern concept of the steady-state economy we must examine two defining elements: constant

population, and constant capital and wealth. In a chapter on the 'stationary' economy, J.S. Mill suggests that 'Even in a progressive state of capital, in old countries, a conscientious or prudential restraint on population, is indispensable, to prevent the increase of numbers from outstripping the increase of capital' (Mill, 1970: 112). Also: 'It is scarcely necessary to remark that a stationary condition of capital and population implies no stationary state of human improvement. There would be as much scope as ever for all kinds of mental culture, and moral and social progress.' (Mill, 1970: 116)

Recently, Herman Daly has defined the steady-state economy as 'an economy with constant population and constant stock of capital, maintained by a low rate of throughput that is within the regenerative and assimilative capacities of the ecosystem' (Daly, 2008: 4)

Both Mill and Daly speak of the need for constant population and capital but they are reluctant to specify the proper ratio between the two. This is probably due to their unwillingness to suggest a standard of living for the average individual, given that every combination of capital and population implies a different per capita product, given the technology of production. In contrast, Plato and Aristotle begin their analyses by specifying what they consider a satisfactory standard of living. As will be seen below, a judgment about the right standard of living is the basis of the Platonic and Aristotelian models.

### Plato's Model

Plato developed two models for the organisation of the city state. The first appeared in his *Republic (Politeia)*, written around 380 BC. According to Plato, 'The first and highest form of the state and of the government and of the laws is that in which there prevails most widely the ancient saying that "Friends have all things in common"' (Laws, 739 C). This model includes the communion of women and children and of property, and for Plato it is the ideal State. Probably because he realised that such a society could not be realised at his time, however, he developed a second model in his *Laws*, which was written late in his life and published in 347 BC. It is this second model which contains some basic elements that justify its characterisation as a steady-state economy, and which, 'when created, will be nearest to immortality and the only one which takes the second place' to that described in the *Republic* (Laws, 739 E).

Plato expounds his model by imagining the creation of a new colony. The first thing to do, he argues, is to 'let the citizens at once distribute their land and houses and not till the land in common, since a community of goods goes beyond their proposed origin and nurture, and education' (Laws, 740 A). The distribution of property should be such that there would 'be no disputes among citizens about property' (Laws, 737 B). The next task is to determine the number of people and the size of land. These must be determined simultaneously so that two requirements must be satisfied: first, citizens must have a decent standard of living, and second, the size of the population must be large enough to be able to defend the city and also help neighbouring cities. In Plato's words, 'The number of citizens can only be estimated satisfactorily in relation to the territory and the neighbouring states. The territory must be sufficient to maintain a certain number of inhabitants in a moderate way of life – more than this is not required; and the number of citizens should be sufficient to defend themselves against the injustice of their neighbours, and also to give them the power of rendering efficient aid to their neighbours when they are wronged.' (Laws, 737 C, D)

The exact size of the land is not specified but the number of farmers<sup>2</sup> given by Plato is 5,040. However, this precise number is chosen because it is divisible by all numbers from one to ten and is helpful in "all contracts and dealings". What is important in the relation between population and land is that they form a common factor, or they become a pair. Plato's text says 'γενόμενα ἀνὴρ καὶ κλήρος συννομή' which Jowett translates 'so that every man may correspond to a lot'.

Plato's central idea here is that land and population should be determined simultaneously in such a way that citizens might enjoy a good but moderate standard of living and the city should be safe from enemies.

Of course, not all land should be allocated for agricultural production. Some land should be set aside for other purposes. Thus, the legislator

should assign to the several districts some God, or demi-god, or hero, and, in the distribution of the soil, should give to these first their chosen domain and all things fitting, that the inhabitants of the several districts may meet at fixed times, and that they may readily supply their various

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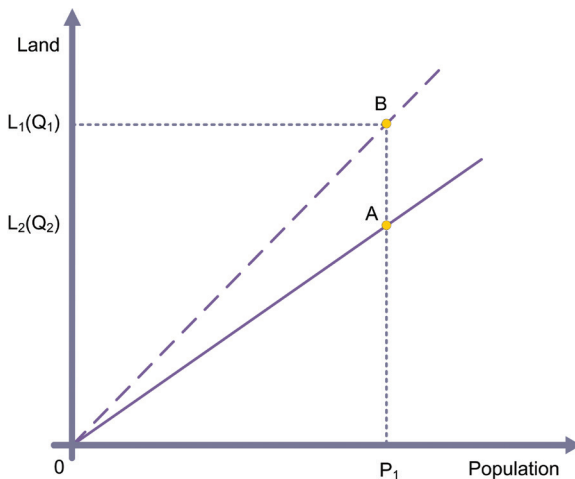
2 Jowett, whose translation I am using, renders the word γεωμόροι as 'citizens'.

wants, and entertain one another with sacrifices, and become friends and acquaintances; for there is no greater good in a state than that the citizens should be known to one another. (Laws, 728 D)

Each holder of land should cultivate his piece, but they should all remember that their land is the common land of their country and therefore they should care for it better than a mother cares for her children. Parenthetically, it is interesting that Plato believes that of all educational studies the best for the economy, as well as for politics and the arts, is arithmetic. This shows not only his interest in mathematics but also a concern for the productivity of land since agricultural production was the main supplier of the basic necessities of life.

Plato's steady-state economy can be presented in a simple diagram. The horizontal axis of Figure 1 measures population and the vertical axis measures land and, implicitly, the level of agricultural production. If all land is devoted to farming the standard of living is given by the slope of the line  $OB$  which determines product per person, i.e.  $L_1/P_1$  and therefore  $Q_1/P_1$ , since the quantity produced ( $Q$ ) is determined by the available land ( $L$ ). If part of the land, shown by the distance  $L_1L_2$ , is used for other purposes, e.g. temples, ceremonies and parades, the product per person will be less – as shown by the slope of line  $OA$ .

**Figure 1. Plato's model of steady-state**



What makes this model a steady-state economy is the following requirement, which Plato states strongly: 'And in order that the distribution may always remain, they ought to consider further that the present number of families should be always retained, and neither increased nor diminished' (Laws, 740 B). In other words, population must be constant. Plato suggests several ways that this can be done. The farm should be inherited by only one child so that the property will not split. Incentives, disincentives and proper advice may be given to encourage or discourage changes in population, as needed. Finally, if necessary, immigration or emigration may be allowed.

Plato recognises that although all citizens may have equal opportunities to begin with, wealth inequalities may arise. Regarding the question of the level of economic inequality that should be allowed among citizens, Plato proposes that the richest citizen be no more than four times richer than the poorest and any excess wealth, however acquired, should be turned over to the city. In his words:

The form of law which I should propose as the natural sequel would be as follows: In a State which is desirous of being saved from the greatest of all plagues – faction, but rather distraction – there should exist among the citizens neither extreme poverty, nor, again, excess of wealth, for both are productive of both these evils. Now the legislator should determine what is to be the limit of poverty or wealth. Let the limit of poverty be the value of the lot; this ought to be preserved, and no ruler, nor anyone else who aspires after a reputation for virtue, will allow the lot to be impaired in any case. This the legislator gives as a measure, and he will permit a man to acquire double or triple, or as much as four times the amount of this. But if a person have yet greater riches, whether he has found them, or they have been given to him, or he has made them in business, or has acquired by any stroke of fortune that which is in excess of the measure, if he give back the surplus to the state, and to the Gods who are the patrons of the State, he shall suffer no penalty or loss of reputation; but if he disobeys this our law, any one who likes may inform against him and receive half the value of the excess, and the delinquent shall pay a sum equal to the excess out of his own property, and the other half of the excess shall belong to the Gods. And let every possession of every man, with the exception

of the lot, be publicly registered before the magistrates whom the law appoints, so that all suits about money may be easy and quite simple. (Laws, 744 D, E–745 A)

Plato also discusses what today we would call monetary policy, but not for the purpose of regulating the economy. He suggests that money should be used for transaction and not for accumulation of wealth. Accumulation of wealth in the form of gold and silver is prohibited. The rationale for this suggestion is that happiness is to be found in virtue, not in wealth. He goes so far as to say that:

The citizen must indeed be happy and good, and the legislator will seek to make him so; but very rich and very good at the same time he cannot be, not, at least, in the sense in which the many speak of riches. For they mean by 'the rich' the few who have the most valuable possessions, although the owner of them may quite well be a rogue. (Laws, 742 E)

### **Aristotle's Model**

Aristotle's model of the steady-state economy appears in Book VII of his *Politics* (*Politica*), written sometime after 336 BC. It is based on the same key variables as that of Plato, namely land, population and standard of living. Aristotle's analysis, however, is more elaborate and includes some variables ignored by Plato.

#### ***(i) The Land of the City***

Aristotle states that the land of the city-state should be within a lower and an upper limit. The lower limit is determined by the need for autarky, for self-sufficiency, a situation in which the city can produce everything and in which the citizens need nothing more. The upper limit is that territory which the city can easily defend against invaders. Aristotle does not specify the upper limit but it is reasonable to assume that it is related to fertility of the land, the military technology of the time, the existing transportation system etc.

Self-sufficiency is very important for Aristotle, and he comes close to equating self-sufficiency with happiness because they are both chosen not for something else but for themselves, i.e. they are both intrinsically good. Self-sufficiency is not meant to apply to a man by himself, one who lives alone, 'but also for parents,

children, wife, and in general for his friends and fellow citizens, since man is born for citizenship' (NE 1097b 11–13). In *Politics*, Aristotle discusses self-sufficiency when referring to the city limits. 'Very much the same holds good about its territory. As to the question, what particular kind of land it ought to have, it is clear that everybody would command that which is most self-sufficing (and such is necessarily that which bears every sort of produce, for self-sufficiency means having a supply of everything and lacking nothing). In extent and magnitude, the land ought to be of a size that will enable the inhabitants to live a life of liberal and at the same time temperate leisure.' (*Politics* 1326b 28–34)

Although the land of the city is divided into public and private land, Aristotle favours private ownership<sup>3</sup> on the grounds that common ownership discourages work and interest in the property, and reduces responsibility. While private property is under the management of the household and the produce belongs to the owner, it can be taxed. The produce of the public land or, in general, the revenues from it can be used for two purposes. First, to finance a system of common meals, through which subsistence is ensured to all citizens, and second, to finance religious ceremonies and worship of Gods.

As to common meals, all agree that this is an institution advantageous for well-organized states to possess ... But the common meals must be shared by all its citizens, and it is not easy for the poor to contribute their assessed share from their private means and also to maintain their household as well. And moreover the expenses connected with religion are the common concern of the whole state. It is necessary therefore for the land to be divided into two parts, of which one must be common and the other the private property of individuals; of the common land one portion should be assigned to the services of religion, and the other to defray the cost of the common meals. (*Politics* 1330a 3–14)

### *(ii) The Size of Population*

According to Aristotle, the size of the city's population should be within limits. The lower limit is that below which the autarky of the city is lost and thus the

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3 In *Politics* (1263a 38–41), Aristotle says 'It is clear therefore that it is better for possessions to be privately owned, but to make them common property in use; and to train the citizens to this is the special task of the legislator'.



reason for its creation and development is negated. The upper limit of population size is determined by considerations related to the effective administration of the city. If the size of population is too large, it will be difficult to run the city effectively and to enforce the law. For example, it would be difficult to find a town crier with a stentorian voice. Also, in an overcrowded city it would be difficult to make the correct decisions regarding the distribution of public offices according to merit, since this requires adequate knowledge of the abilities of individual citizens. Contrary to Plato, who specifies the exact number of farmers, Aristotle provides no exact limit except in one case by way of an example: 'You cannot make a city of ten men, and if there are a hundred thousand it is a city no longer. But the proper number is presumably not a single number, but anything that falls between certain fixed points.' (*Nicomachean Ethics* 1170b 30–33)

However, Aristotle further develops his thesis, arguing:

Similarly, a state consisting of too few people will not be self-sufficing (which is an essential quality of the state), and one consisting of too many, though self-sufficing in the mere necessities, will be so in the way in which a nation is, and not as a state, since it will not be easy for it to possess constitutional government – for who will command its over-swollen multitude in war? Or who will serve as its herald, unless he who have the lungs of Stentor? It follows that the lowest limit for the existence of a state is when it consists of a population that reaches a minimum number that is self-sufficient for the purpose of living the good life after the manner of a political community. It is possible also for one that exceeds this one in number to be a greater state, but, as we said, this possibility of increase is not without limit, and what the limit of the state's expansion is can easily be seen from practical considerations. (*Politics* 1326b 2–13)

Clearly, Aristotle suggests that increasing population up to a certain size goes along with the increasing capability of the state to perform its function efficiently, but after a certain size, strong diseconomies appear. Therefore, between the two extremes there is an optimal population size. The actual optimal size is related to the territory of the city and notion of good life.

### *(iii) The Best Life*

The relationship between population and land is determined by the notion of the 'best life', which presupposes wealth of material goods and virtue. 'But a better definition would be "to live temperately and liberally" (for if the two are separated a liberal mode of life is liable to slip into luxury and a temperate one into a life of hardship), since surely these are the only desirable qualities relating to the use of wealth' (1265a 33–38). The attribute of the best life refers both to individuals and to the state. 'For the present let us take it as established that the best life, whether separately for an individual or collectively for state, is the life conjoined with virtue furnished with sufficient means for taking part in virtuous action' (1323b 40 – 1324a 2). Thus, for Aristotle, possession of wealth is intrinsically desirable, but only insofar as it is put to good use. Wealth is necessary for the well-being of citizens and of the state; Aristotle defines it as 'the plenty of coined money and territory, the ownership of numerous, large and beautiful estates; also the ownership of numerous and beautiful implements, livestock, and slaves. All these kinds of property are our own, are secure, gentlemanly and useful.' (*Rhetoric* 1361a 12–15) However, contrary to the claims of the Athenian statesman Solon<sup>4</sup>, Aristotle believes that the contribution of wealth, i.e. of external goods, to welfare has a limit:

For the amount of such property sufficient in itself for a good life is not unlimited, as Solon says that it is in the verse. (*Politics* 1256b 30–34)  
For external goods have a limit, as has any instrument (and everything useful is useful for something), so an excessive amount of them must necessarily do harm, or do no good, to its possessor. (*Politics* 1323b 7–10)

### *(iv) Population Control*

For the regulation of population, Aristotle thinks that 'there must be a limit fixed to the procreation of offspring' (*Politics* 1335b 23–24). Also, he suggests that 'it is fitting for women to be married at about the age of eighteen and the men at thirty-seven or a little before' (*Politics* 1335a 28–30). The last suggestion is made

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4 It is interesting that the difference between Aristotle and Solon has its modern expression in the difference between neoclassical economists who claim that utility increases monotonically with income and those who claim (for example, Layard 2003 and Easterlin 2001) that after a level of income further growth does not raise welfare.

for population health purposes, but is clear that it can keep population growth in control. He also suggests for the same purpose that 'persons exceeding this age [of fifty for men] by four or five years must be discharged from the duty of producing children for the community' (*Politics* 1335b 22–24). It is characteristic of the significance Aristotle attributes to population control that he suggests that 'if any people have a child as a result of intercourse in contravention of these regulations, abortion must be practiced on it before it has developed sensation and life' (*Politics* 1335b 24–25).

#### (v) *Poverty*

Aristotle recognises that in every society there will always be rich and poor people. Poverty is a danger to the city, and there are two ways to deal with it. One is the welfare system. Aristotle believes that the welfare system can offer temporary relief but does not solve the problem 'because this way of helping the poor is the legendary jar with a hole in it' (*Politics* 1320a 32–33). On the contrary, it perpetuates the problem. However, common meals as part of a welfare system are accepted and recommended (*Politics* 1330a 2–5). The other way to reduce poverty is through substantial financial aid to poor citizens in order to buy property and start some productive activity, or to allow them to use land for the same purpose:

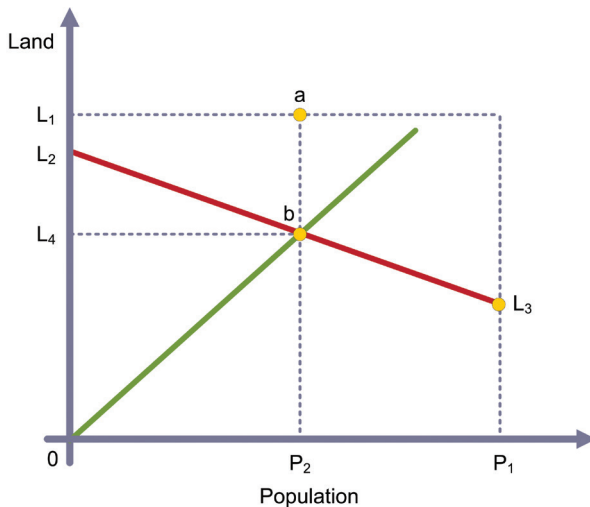
Measures must therefore be contrived that may bring about lasting prosperity. And since this is advantageous also for the well-to-do, the proper course is to collect all the proceeds of the revenues into a fund and distribute this in lump sums to the needy, best of all, if one can, in sums large enough for acquiring a small estate, or, failing this, to serve as capital for trade or husbandry. (*Politics* 1320a 35–40)

#### (vi) *A Graphical Representation of Aristotle's Model*

The above elements, i.e. city size, division of land, population and best life, can be combined in a simple diagram to make explicit the Aristotelian model of optimal population size. The vertical axis of Diagram 1 shows the size of land. The beginning of the axis at point 0 corresponds to the minimum size required for autarky and point  $L_1$  corresponds to the maximum size so that the city can be defended effectively. The horizontal axis measures the size of population. The beginning of the axis at point 0 corresponds to the minimum size required

for autarky and point  $P_1$  corresponds to a population size beyond which serious diseconomies become effective. When the size of population is at the beginning of the axis, the public land which is needed to finance common tables and religious worship is  $L_1L_2$  and the remaining  $OL_2$  is private land. When population increases to, say,  $P_2$ , the needed public land also increases to  $ab$ . In other words, as the size of population increases, more public land is required. Thus, line  $L_2L_3$  divides the land in private and public for every population, given the territory of the city. It is drawn with a negative slope on the assumption that the number of people in need increases with the size of population.

**Figure 2. Aristotle's model of steady state.**



The size of population will be determined by the combination of land and population that produces a level of output per citizen sufficient for a wise and generous life. If such a combination is, for example, the one corresponding to  $b$ , then the size of the population would be  $P_2$ , the size of private land would be  $OL_4$  and the rest of land of a size  $L_4L_1$  or  $ab$  would be public land the proceeds from which would cover the expenses for common tables and religious worship and ceremonies. The land-population ratio is equal to the slope of the line going through the origin and point  $b$ . Thus, in this case the population of citizens should

be  $OP_2$ , total land should be  $OL_1$ , private land  $OL_4$  and public land  $L_1L_4$ .

From this graph it becomes obvious that as soon as the limits of land and population are determined, the critical factor for the determination of the actual land/population ratio are two: (a) the optimal per citizen output, and (b) the division of land between private and public. It should be noted that the optimal per citizen output is not the maximum average product of labour except by chance. In Aristotle's thinking, the biggest size or the maximum quantity is not necessarily optimal. Optimality is defined in terms of what constitutes the best life.<sup>5</sup>

### Discussion

In comparing the two models outlined above with those of modern writers, one should keep in mind some obvious differences in both the content of terms and in social institutions. Thus, land or territory in the ancient texts should be taken to represent resources in modern terminology, and distribution of land and products is the equivalent of distribution of wealth and income, respectively. Technology of production is not mentioned and is implicitly assumed to be constant, but changes in technology can be easily introduced in the two models presented above.

Plato and Aristotle are very much concerned with social justice and the happiness of citizens as individuals and also as a totality which forms society. In modern times it is implicitly assumed that higher income brings happiness or that it is a precondition for achieving happiness. For these ancient writers, wealth is not a precondition for a happy life. Of course, it should be high enough to allow a temperate and generous life-style but happiness is almost synonymous with virtuous action.

Population control is important for Plato and Aristotle as a means of achieving equilibrium between limited land, i.e. fixed resources, and the production needed for a comfortable standard of living. Today, with environmental problems bringing the Earth to the brink of catastrophe, many writers ignore the effects of overpopulation and population control is beyond their consideration. Many modern writers seem to hold the naïve belief that technology has all the answers

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5 For a more detailed presentation of Aristotle's model see Lianos (2016).

to the environmental and social problems and/or that population controls interfere with the liberties and the free choices of individuals. At the same time they ignore the negative externalities of overpopulation and the limited capacity of the planet to provide a good life for all.

## Conclusion

The models of Plato and Aristotle presented above are not just part of the history of ancient economic thought. They contain two important truths. First, social harmony presupposes a certain relationship between the available resources and the size of population. Second, that relationship requires communal decision-making regarding the size of population and social controls enacted to avoid overpopulation.

In Plato and Aristotle (and also in the Stoics, Cynics and Epicureans) the life-style implied in their version of steady-state economies was a rational choice based on their idea of the 'best life'. In modern writers the model of a steady-state economy (and also the ideas of degrowth, agrowth, simpler life, green New Deal, etc.) becomes a necessity if we wish to avoid the ecological catastrophe foreseen by many. It is interesting to speculate that future generations, fearing universal misfortune and even the extinction of the human race, may come to reconsider, albeit possibly slowly and gradually, the approach taken to reproduction within the wisdom of the ancient Greek philosophers.

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