

# Turgot's Capital Theory

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## Introduction

In 18<sup>th</sup> century France, a plethora of ideas about the political economy existed. Theories of production and distribution, value, money, international trade, economic policies and intervention, as well as many other ideas were developed and refined. For Physiocrats and other liberal economic authors, economic society works for its own sake. This idea sharply contrasts with Colbertism, which concludes that society ought to be controlled carefully by the state through protection and restraints. For them who were willing to respect and favour individual liberty, free trade, and moderate political or social reform, only competition under the '*laissez-faire et laissez-passer*' would bring about an autonomous equilibrium of markets and result in the maximum benefit to society.

We know it very well that French political economy was born in the late 17<sup>th</sup> century (studied by Boisguillebert), led and developed by the works of Cantillon, and of the Physiocrats, especially of François Quesnay who invented the '*Tableau Économique*' in the 18<sup>th</sup> century. In this essential period of transition from the agricultural societies to the newly coming industrial capitalist economy, Anne Robert Jacques Turgot (1727-81), a great French intellect of the late 18<sup>th</sup> century, concentrated to elaborate his own idea on how the economy worked, although paying his great respect to Quesnay.<sup>1</sup>

The purpose of this paper is mainly to examine the concept of 'capital' in Turgot's masterpiece, *Reflections on the Formation and Distribution of Wealth*, and to clarify the analytical rigorosity of his study on 'value and distribution'.

## 2. Life of A. R. J. Turgot and his works

Anne-Robert-Jacques Turgot was born in 1727 in Paris and died there in 1781. His father, Michel Etienne Turgot was Marquis of Sousmont, and 'Prévôt des marchands (Mayor)' of Paris. Turgot studied mainly theology at Sorbonne, but at the same time, he devoted himself to studies of philosophy, history, jurisprudence, mathematics, and political economy, which laid the foundations for his later role as an Encyclopedist. He removed himself from any religious positions just after his father died, and went into the state sector. He was installed as the representative of the King of Limousin, Marche, and Angoumois (1761-74), and later promoted to be Contrôleur Général (the minister of the economy and finance, 1774-76). When appointed, he counselled the king Louis XVI the following three warnings to reconstruct the nation's finances: (1) no bankruptcy, (2) no increase of taxes, and (3) no loans.<sup>2</sup> During his period as minister, Turgot tried to promote free

trade, abolishing traditional regulations that limited a privilege of trade to a big merchant with political connections, and to eliminate compulsory services from farmers (these reforms are known as a part of his six edicts of 1776). Although involved in the group of the Ancien Régime, he endeavoured to reform the French political system and to divert part of the King's powers to the elected assemblies. In 1774, people were faced with the bad harvest and the price hike of grain, and riots erupted reflecting fears that grain produced internally might be sold elsewhere abroad in free trade and people would not be able to achieve food. People demanded the lowering of prices of wheat than that formed by merchants in the market. Turgot believed that a substantial rise in prices of agricultural produce in the would stimulate its supply and it would be better to entrust the situation with the activity of the competitive market, and sent 25,000 soldiers to protect the orderly trade in markets. This would be one of presages that he lost his position, being condemned by both upper and lower classes in 1776.

Turgot is considered to have belonged to the sensationists led by John Locke, Etienne Condillac, and other notable thinkers. He also approved of J. J. Rousseau's idea in his *Contrat social*. Within the scope of sensationist philosophy, he seriously sought to develop 'a coherent set of economic and political ideas', combining them with 'an assumption that the economic behaviour of people was fundamentally self-interested' (Facarello, 2006: 1-2). He developed an analytical framework of the concepts of capital and free competition, and a theory of value, production, and distribution.

Among his works, studies on political economy are the followings:

- 1) Plan d'un ouvrage sur le commerce, la circulation et l'intérêt de l'argent, la richesse des Etats, 1753-54.
- 2) Foire (article for l'Encyclopédie), 1757.
- 3) Fondation (article for l'Encyclopédie), 1757.
- 4) Éloge de Vincent de Gournay, 1759.
- 5) Questions sur la Chine adressées à deux Chinois, 1766.
- 6) Réflexions sur la formation et la distribution des richesses, 1766.
- 7) Observations sur les les mémoires récompensés par la Société d'Agriculture de Limoges, 1767.
- 8) Valeurs et Monnaies, 1769 (?).

This chapter will examine mainly *Réflexions sur la formation et la distribution des richesses* (hereinafter, the *Réflexions*, and we use the English version, *Reflections on the Production and Distribution of Wealth*, translated by P. D. Groenewegen and published in 1977), since this text is the only book that Turgot wrote on the idea of economic thinking in an almost accomplished and comprehensive manner. This text is indeed exciting, for 'in it we find the utilization of terms such as 'capital', 'utility', and 'equilibrium' in their appropriate economic contexts' (Murphy, 2009, 144). The *Réflexions* was written in 1766, and published by instalments in 1769-70 for *Éphémérides du citoyen*, a journal of the Physiocrats.<sup>3</sup>

### 3. Natural Order and Free Trade: Influence of Quesnay and Gournay

According to liberal economic thinkers, Government officials could not organize or control the economy rationally and effectively; the limit on the number of sellers brought about by exclusive privileges would harm the position of the consumer and lead him to buy inferior goods. The restriction of exports leads to a decrease in the number of buyers. This limitation in turn will bring about a price that cannot cover the seller's expenses and risks. Finally, the seller might cease production of a given commodity. Government intervention through taxes, regulations, and price controls interferes with the activities of merchants and disturbs the natural laws in the markets. Intervention and regulation by the state brought nothing but economic difficulties.

The general liberty of selling and buying, including foreign trade is the only means to insure a 'bon prix (good price)' for the seller to cover the production cost or more, and the best quality of goods to the consumer at a sufficiently low price.

The laws for the Physiocrats referred to the laws inherent in the nature of mankind and those governing supply and demand in the liberalized free market (On September 17, 1754, the king ordered to abolish all restrictions on trade in wheat and corn, but a subsequent crop failure brought about a rise in prices, and the order was rescinded on December 23, 1770). 'Physiocracy' means the rule of nature, and for the Physiocrats, only land is the source of national wealth and only agriculture brings a surplus. A manufacturing sector consumes as inputs for production as much value as it creates in output, and produces no added value. For the Physiocrats, the only productive source for the economy is agriculture.

Quesnay, the mentor of the Physiocrats, invented the *Tableau économique* that describes the circular flow of commodities between sectors. In the *Tableau*, Quesnay put several assumptions. That is,

- 1) a society is made up of three classes: landlords (landowners), farmers, and people in commerce and industry,
- 2) the model consists of two sectors: agriculture, and commerce and industry,
- 3) the production should be repeated over time (every year),
- 4) money is indispensable for commodity exchange,
- 5) only agriculture is productive, and the commercial and industrial sectors are unproductive and sterile.

The last, fifth assumption is most crucial to understand both the *Tableau* and the Physiocrats. They believed that wealth was derived solely from land. Further, they thought that labour is the only source of value, but at the same time, claimed that only labour in agriculture could create that value and labour in industry was unproductive.

It is quite popular that the *Formule* (1766), which was made by Quesnay to let common people understand the mechanism of the *Tableau* well, exhibits the ‘*produit net*’, the net product being brought only in the agricultural sector. However, it is admitted that even in the first version of the *Tableau*, in the *Tableau original* (1759), Quesnay already entertained an idea that the net product could be brought solely from agriculture. For the Physiocrats, all surplus in production will pass into the landowners’ hands, and in general, no profit will be realized (especially in the stationary state).<sup>4</sup>

For the Physiocrats, the law of nature is the law characterized by physis in Greek philosophy and moral science, and economic society should work for its own sake. The national economy could reproduce itself autonomously under free competition, and the autonomous and balanced pursuit of the economy under ‘*laissez-faire et laissez-passer*’ would spontaneously bring about autonomous equilibrium and maximum benefit to society.

However, with regard to credit and finance, French thinking of the 18th century was strongly influenced by the breakdown of ‘the system of Law’. The collapse of John Law’s idea that the creation of money was the decisive factor in increasing national wealth, and its practice, helped people to realize the illusions of money and the true substance of wealth. As further issuance of paper money provoked hyperinflation, enthusiasm for credit turned to disgust and distrust. People became aware that there was no more certain revenue than that brought from land. People went to farming, finding that the property of land should be eternal. For the Physiocrats, the source of wealth must be somewhat certain and solid.

Another person who had a great influence on Turgot’s thinking was Claude-Marie Vincent de Gournay (1712-59), an Intendant of commerce. Turgot met Gournay in 1750s. He was a leader of French economists at that time in the sense that he motivated Forbonnais, Morellet, Turgot, and other ‘economists’ to study the system of social economy, write on it, translate, and edit books. He translated Josias Child’s *A New Discourse of Trade* into French with detailed comments (Takumi Tsuda found Gournay’s own ‘*Remarques*’ on *A New Discourse of Trade* at the Bibliothèque municipale de Saint-Breivuc. See Tsuda, 1976, 77). It was that time that the term *économistes* was used first to show a group of writers on economic issues (Murphy, 2009: 137). Gournay and his colleagues criticized strongly Colbertism of intervention and regulation. The point of Gournay’s idea was to make French economy more competitive and strong under the slogan of ‘*laissez-faire, laissez-passer*’.<sup>5</sup> It was quite evident that Gournay had a great influence on Turgot, as he wrote ‘*Éloge de Vincent Gournay*’ very shortly after Gournay died.

Turgot developed Gournay’s idea of ‘*laissez-faire*’ and elaborated the demand and supply approach that was already conceptualized by P. le P. de Boisguilbert (1646-1714). He took the position of the individualism that emphasized the right of individual people in society to make their own decisions and recognized the importance of each individual decision on their behaviours. He wrote,

This whole so-called *system* was founded on this maxim, that in general every man knows his own interest better than another to whom it is of no concern. Hence he [Gournay] concluded that when the interest of individuals is precisely the same as the general interest, every man ought best to be left at liberty to do what he likes. Now, in the case of unrestrained commerce, M. de Gournay thought it impossible for the individual interest not to concur with the general interest. (1977[1759]: 25-6)

He also said,

There is no need to prove that each individual is only competent judge of this most advantageous use of his lands and of his labour. He alone has the particular knowledge of without which the most enlightened man could only argue blindly. He alone has an experience which is all the more reliable since it is limited to a single object. He learns by repeated trials, by his successes, by his losses, and he acquires a feeling for it which is much more ingenious than the theoretical knowledge of the indifferent observer because it is stimulated by want. (1977[1759]: 28)

Turgot strongly criticized and objected to any State intervention to the economy saying that ‘in all respects in which commerce may interest the State, unrestrained individual interest will always produce the public welfare more surely than the operations of government, which are always faulty and of necessity directed by a hazy and dubious theory’ (1977[1759]: 29).

He ‘developed, on the supply side, a systematic approach in terms of capital competition and, on the demand side, a subjective theory of value and prices’ (Faccarello, 2016: 75). Both Quesnay and Turgot pointed that farmers needed capital in advance to start the production. They also claimed that farmers could increase their produce every year using and investing a part of profits they earned. Therefore, they already had a concept of ‘investment’ in the dynamic state.

Turgot had a similar idea to that of Quesnay so far as the productivity of land was concerned:

It [=what the nature grants] is the physical result of the fertility of the soil, and of the wisdom, far more than the laboriousness, of the means which he [= the husbandman] has employed to render it fruitful. As soon as the labour of the Husbandman produces more than his wants, he can, with the surplus which nature accords him as a pure gift above the wages of his toil, purchase the labour of other members of society. ... He [= the husbandman] is, therefore, the unique source of the wealth which, by its circulation, animates all the industry of society, because he is the only one whose labour produces more than the wages of his labour. (1977[1766]: 46)

However, for Turgot, the main problem of the Physiocrats was that they thought only agriculture was able to produce the added value. In the same sense, they thought that manufacturing produced nothing as it just changed the form of materials.

Turgot claimed, opposite to the Physiocrats, that any sectors could acquire the same rate of return from their investment, and in general, profit rates must be equalized in every sectors including stock market such as the money lending or the trade of land (people buy the land because it brings rent, and the rent rate, which is defined as a ratio between the rent and the market value of the land, should also be equalized to the general profit rate).

#### **4. Capital, Money, and Entrepreneurship**

Turgot is the first economist who used the terminology ‘capital’ in economics. Among his predecessors, Cantillon for example, used ‘capital’, but in most cases, it meant bonds. Turgot defined ‘capital’ as follows:

Whoever, either from the revenue of his land, or from the wages of his labour or industry, receives each year more value than he needs to spend, may set aside this surplus and accumulate it: these accumulated values are what is called *a capital*. (1977[1766]: 69).

Turgot, rather unexpectedly, accorded more importance to money. In his time, society was already organized as a money-oriented economy and money has had an indispensable role for commodity-exchanges and as a means of capital accumulation.

It is perfectly the same whether this sum of value, or this capital consists of a mass of metal, or of any other matter, since money represents every kind of value, just as every kind of value represents money. (1977[1766]: 69)

Turgot gave the definition on the properties of money in the title of the section 39 as follows: ‘Every commodity has the two essential properties of money, of measuring and representing all value; and in this sense all merchandise is money’ (1977[1766]: 61). For the reason why gold and silver are the most suitable for money, he put their properties being more divisible, more unchangeable, and of more easy conveyance than other commodities, and concluded ‘it is more convenient to use them [=gold and silver] to measure and represent value’ (1977[1766]: 63).

Two properties of money just mentioned are related to (1) the measure of value, and (2) the medium of exchange. But money has another important role, (3) the store of value. Turgot noticed a positive aspect with regard to the third property, which ‘linked to what he called ‘the true idea of the circulation of money’’ (Faccarello and Steiner, 2012: 348).

In this way, Turgot thought that the necessity of the ease of its accumulation made money the most desirable object among moveable wealth and it became ‘the means of accumulation unceasingly by the simple means of thrift’ (1977[1766]: 68).

One of the most important roles of money is to link savings and investment. The introduction of money into economic society facilitated and resolved the difficulty of transforming surplus into future capital. The surplus constitutes a part of income over consumption, and could be formed by savings. The surplus is made up of a part of producers’ output, or formed of money after their output being sold. For Turgot, ‘the surplus accumulated through savings could be held in commodities or money. ...Turgot wanted to demonstrate the way in which savings could be translated into ‘capital’ (Murphy, 2009: 146). According to Murphy, there are two models of investment behaviour in Turgot. One is the self-financing investment behaviour, and the other is the loan investment behaviour. As far as manufacturing, agriculture, and trade, entrepreneurs’ investment behaviours are confined to the self-financing. They obtain funds for their investment-schedules through their own savings. Turgot thought that their thrift enables them to retain profits for investment and their own profits were channelled into investment for their own activities. It seems that Classical economists inherited this idea of the automatic reinjection of savings into investment.

He referred to the loan investment model that dealt with the accessibility to the loan market as well. If entrepreneurs want funds for investment, they will search somebody from who they can borrow, and those who have enough savings or excess money will desire to lend it to somebody else. Thus, the money market is organized between borrowers and lenders. Turgot noticed that the interest rate would play an important role to link savings and investment in the money market. He believed that the rate of interest must be determined by supply of and demand for money, like prices of other commodities:

[T]he price of money is regulated like that of all other commodities, by the balance of offer and demand: thus, when there are many borrowers who need money, the interest of money becomes higher; when there are many owners who are ready to lend, it falls. (1977[1766]: 81)

In this way, Turgot emphasised that loanable funds were brought through savings and it would be lent to borrowers at interest. Its rate will be set by the supply of and demand for loanable funds at the money market, and therefore, it is not the quantity of money existing in the economic society.

The owner of capital, that is, of money, can use it to purchase lands for revenues (=rents), or partly for the construction of the establishment and the purchase of materials, partly for the daily wages of labourers who work for the preparation of the materials, or for lending to earn interest.

Even so, in addition to the precious metals, what was money that should be used in the real economic activities? By the end of the era of Louis XIV, the national treasury was almost bankrupt

by long years of war. Then, John Law (1671-1729) came to France with his desire to change the world of money and banking. Thanks to the kindness of Philippe II, Duc d'Orléans, he was appointed the Contrôleur general des finance, and issued paper money first in France. Law expressed his idea that the only original source of wealth was a lot of money. He indicated that the issue of insufficient money is what provoked the crisis of the France absolute monarchy. For him, the stock of metallic currency was of no use if it does not circulate actively. Rather, paper money, without having any intrinsic value, was the most convenient vehicle to realise the maximum velocity of circulation. After the success of the *Banque Générale*, Law established a mega conglomerate trading company, called Mississippi Company in 1717, the capital of which was allocated to redeem the public debt afterward. After the euphoria of the stock market, weakness dominated the market so that the Mississippi Company collapsed. By the end of 1720, even banknotes gave up the position of being legal tender.<sup>6</sup>

The thinking of the 18<sup>th</sup> century France concerning money was strongly influenced by the breakdown of 'the system of Law'. The collapse of Law's idea that the creation of money was the decisive factor in increasing national wealth helped people to realize the illusions of money and the reality of wealth. With the hyperinflation provoked by further issuing paper money, the enthusiasm of people about the credit system turned to disgust, and their fanaticism switched to distrust. The influence of the breakdown of the Law system was so strong, that Turgot could not accomplish the idea of possible methods of financing capital formation. Murphy said that it is more than striking to note that in the *Réflexions*, Turgot never once mentioned the words 'bank' or 'credit' (Murphy, 2009: 134).

## **5. Comparison of Quesnay's price system and that of Turgot**

### 5-1. Quesnay's 'bon prix'

Quesnay's price system consists of two sectors, that is, of the agricultural sector and of the manufacturing sector. The peculiarity of the Physiocracy can especially be seen in price determination, namely, that for them, the price of agricultural produce should be formed to generate net product, whereas the price of manufactured products does not necessarily need any part of net product or of profit. Agriculture is productive, whereas manufacturing is unproductive.

The idea of Quesnay is that the price of agricultural produce should be above the cost of production, while the price of manufactured products is regulated to the cost of production under market competition. The highest level of the market value of 'wheat' under free competition is called 'bon prix (good price)', which is the same as 'cherté', or 'haut prix'. For Quesnay, 'bon prix' is *alpha* and *oméga* of 'la science économique'. With this highest market value of wheat, agriculture can generate a net product, or surplus value as a part over the cost of production.

In the case of manufactured goods, their price is determined by cost. For Quesnay, the process of manufacturing industries could not generate any net product, for it only metamorphoses inputs,

which consist of agricultural produce, into manufactured goods.

The realization of the net product, being passed on to the hands of landowners, is solely related to the level of the price of agricultural produce. In the *Tableau*, Quesnay did not give any prices determined endogenously within the system of reproduction. Rather, there are some indications that he assumed the '*bon prix*' from the beginning in favour of generating the net product in agriculture, which will be passed to landowners as rent. It is sure that Quesnay himself claimed that only the absolute freedom of trade, and the equalization of the price of the seller and the price of purchaser in all markets could establish a uniform price (= indifferent price). However, he is not so clear regarding what factors will bring and determine the level of such '*bon prix*'.

#### 5-2. Turgot's Price System and the Idea of the Equalization of Profit Rates

By contrast with Quesnay, as we already pointed out, Turgot rather focused on 'capital' and its capability of generating earnings and profits from whatever sort of sectors or economic activities:

The Entrepreneurs either in Agriculture or in Manufacturing, draw their advances and their profits only from the sale of the fruits of earth, or of the manufactured commodities.

(1977[1766]: 73)

He thought that everyone was interested in becoming rich, and the only way to do so after all the land was already occupied by landowners, was to produce an annual profit and reserve this surplus every year so as to form capital (= investment), by means of which capitalists and entrepreneurs could then further increase their profits. Many people are interested in and occupied with accumulating capitals. In the beginning of the paragraph 82 in the Reflections, he also stated:

The fall in the rate of interest proves that thrift generally has prevailed over luxury in Europe.

(1977[1766]: 85)

Turgot expressed the magnificent under-mentioned ideas with regard to the differentiated profit rates. We will put them in order by the higher ones (1977[1766]: 85-86):

- 1) To invest money (= capital) in agricultural enterprises by taking a lease of land, the produce of which ought to yield over the rent, the interest on the advances, and the wages for workers in agriculture and his tools for cultivation (profit rate).
- 2) To invest in manufacturing (profit rate).
- 3) To invest in commercial enterprises (profit rate).
- 4) To lend money to those who need it with an annual interest (interest rate).
- 5) To buy land to receive definite revenue (rent rate).

The reason that the rate of rent the landowner receives is lowest is that he does not take any risk and simply enjoys his revenue. One of the most significant points here is, the position of the level

of the interest rate. According to Turgot, it must stay between the profit rate and the rate of rent. Even though there must exist a kind of hierarchy in the rates of earnings, at the same time, the competition works in the capital market and that will bring the stable relations of rates of profit and earnings over time. His idea of this should be decisively incompatible with that of Quesnay.

### 5-3. The Rate of Return from Capital in General and ‘the Purchase of a Landed Estate’

In the following, we consider the production system that consists of agriculture (1) and manufacturing (2). Produce from land is diminishing as the cultivation proceeds. That is, at least in agriculture, Turgot definitely assumed the law of diminishing returns of land:

All pieces of ground are not equally fertile; two men with the same area of land and the same amount of labour, may reap a very different harvest. (1977[1766]: 48)

So, as Ricardo did in agriculture after 50 years, we assume diminishing returns to scale with regard to land and that the most marginal (the most inferior) land does not produce any rent. The manufacturing sector follows a constant return. The surplus from land is attributed to landlords as rent, and not only in manufacturing, but also the agricultural capitalist behaves in a profit maximizing fashion.

In the below mentioned equations,  $X_1$  ( $X_2$ ) indicate the volume of output in agriculture (1) (in manufacturing (2)),  $L_{1(2)}$  shows the total amount of labour hired in agriculture (1) (in manufacturing (2)),  $K_{1(2)}$ , the total amount of capital needed in agriculture (1) (in manufacturing (2)),  $T$  the extent of land, and  $F_{1(2)}$  the production function of each sector:

$$X_1 = F_1(K_1, L_1, T), \tag{1}$$

$$X_2 = F_2(K_2, L_2). \tag{2}$$

The land is needed only in agriculture. In agriculture, it is assumed that inputs of capital  $K_1$ , and labour  $L_1$  for agriculture are utilized in proportion to the size of land  $T$ , so that the small letters  $k_1$  and  $l_1$  indicate capital and labour needed per unit of land, say, per acre. Moreover, returns from the marginal land will diminish, because the land is limited and the quality of land will deteriorate as the cultivation proceeds. In manufacturing, we assume constant returns to scale, and that production technologies follow linear production function:

$$\begin{aligned} K_1 &= K_1(T) = k_1T, \quad L_1 = L_1(T) = l_1T, \quad k_1 \text{ and } l_1 \text{ are constant,} \\ X_1 &= F_1(k_1T, l_1T, T), \quad \frac{\partial X_1}{\partial T} > 0, \quad \frac{\partial^2 X_1}{\partial T^2} < 0. \quad (\text{Agriculture}) \tag{1'} \\ K_2 &= k_2X_2, \quad L_2 = l_2X_2, \quad k_2 \text{ and } l_2 \text{ are constant,} \end{aligned}$$

$$X_2 = F_2(k_2X_2, l_2X_2). \quad (\text{Manufacturing}) \quad (2')$$

One of the most striking point of Turgot's thoughts is seen in his analysis on the nature of the rate of return. Since Adam Smith, economists have thought of rent revenue as a residual, and almost no economist has come up with a convincing theory of why people invest money in land and how the current price of the land is set. On this point, Turgot was prominent in claiming that there should exist a rate of return on land as well, and it should be equalized to the rate of profit in general (except that the hierarchy of profit rates is observed in reality):

Since a landed estate of a certain revenue is only the equivalent of a sum of value equal to this revenue multiplied a certain number of times, it follows that any sum whatsoever of value is equivalent to a landed estate producing a revenue equal to a definite fraction of this sum.

(1977[1766]: 69)

In the following, the price of agricultural product is taken as numéraire,  $p$  shows the relative price of manufactured goods with regard to agricultural product,  $r$  the profit rate (equalized between sectors by competition), and  $w$  the wage rate. We introduce the method of finite difference, number for each size of land necessary to produce a unit of agricultural produce in accordance with the fertility  $\Delta T^i$ , and write the total rent from the land as  $R(T)$ . Since the marginal rent (= marginal revenue from land) is diminishing in accordance with the expansion of cultivating, we get the following price equation in agriculture (it is assumed that the real wage rate  $w^*=w/p_1$  is fixed at the subsistence level):

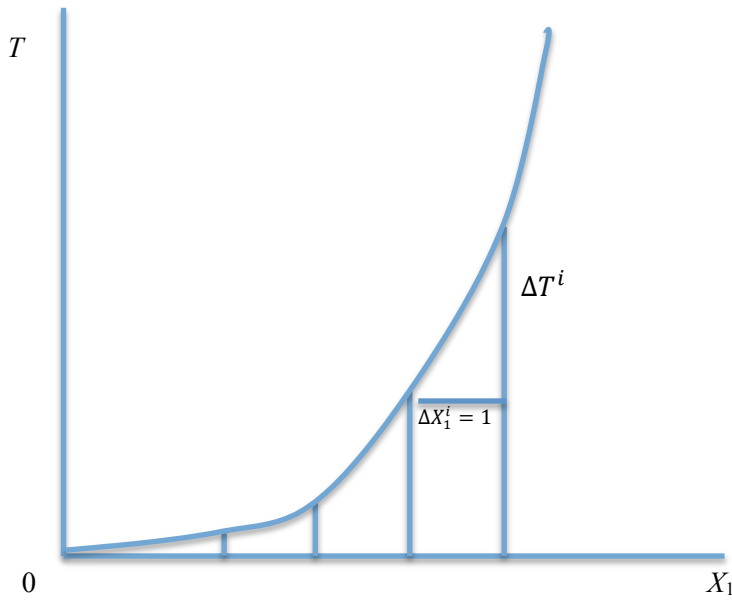


Figure 1. On the fertility of land

*total size of land*  $T = \Delta T^1 + \Delta T^2 + \dots + \Delta T^i + \dots + \Delta T^j$ ,

*on the each size of the fragment of land:*  $\Delta T^1 < \Delta T^2 < \dots < \Delta T^i < \dots < \Delta T^j$

*On fertilities,*  $\Delta R^1 > \Delta R^2 > \dots > \Delta R^i > \dots > \Delta R^j$ , *at the marginal land,*  $\Delta R^j = 0$ .

*total rent*  $R = \Delta R^1 + \Delta R^2 + \dots + \Delta R^i + \dots + \Delta R^j$ ,

$$1(\text{numeraire}) = (pk_1 + w^*l_1)\Delta T^i(X_1)(1+r) + \Delta R^i, \quad (3)$$

$$1 \times X_1 = (pk_1 + w^*l_1)(\sum_{i=1}^j \Delta T^i(X_1))(1+r) + R.$$

Capitalists or entrepreneurial capitalists in agriculture and manufacturing must have enough money-capital in advance, before the output is actually realized. So, a reward is to be paid for their efforts, and the total cost of output should include normal profits or interests in both sectors. Each fragment of land  $\Delta T^i$  will produce an additional increase of the rent  $\Delta R^i(T)$  according to its fertility, but the last, marginal land  $\Delta T^j$  will not give any rent. As we asserted, Turgot pointed out that people could buy even land with paying money, and was attempting to build the theory of setting the price per unit area of land itself. So, we introduce the price of a unit of land (one acre, for example) and write it  $p_t^i$ . We rewrite (3) as (4), and we put the price equation of the manufacturing sector as following:

$$\text{the market value of the total land } V_t = \sum_{i=1}^j p_t^i \Delta T^i(X_1),$$

If we write the rate of revenue from each land  $\Delta T^i$  as  $t^i$ ,

$$R = \Delta R^1 + \Delta R^2 + \dots + \Delta R^i + \dots + \Delta R^j = \sum_{i=1}^j t^i p_t^i \Delta T^i(X_1)$$

$1 = (pk_1 + w^*l_1)\Delta T^i(X_1)(1+r) + \Delta R^i$ , and rewrite this to the following:

$$1 = ((pk_1 + w^*l_1)(1+r) + t^i p_t^i) \Delta T^i(X_1) \quad (4)$$

$$p = (pk_2 + w^*l_2)(1+r) \quad (5)$$

Since Turgot said that any capital should afford the same rate of revenue to any kind of economic activities, that is, to any sectors, we assume that the rate of revenue from land (= the rate of rent)  $t^i$  is equalized to the profit rate  $r$ . Then, we get the following price equations:

$$1 = ((pk_1 + w^*l_1)(1+r) + r p_t^i) \Delta T^i(X_1) \quad (6)$$

$$p = (pk_2 + w^*l_2)(1+r) \quad (7)$$

With (6),

$$r p_t^i \Delta T^i = 1 - (pk_1 + w^*l_1)(1+r) \Delta T^i(X_1).$$

Therefore,

$$p_t^i = \frac{1}{r\Delta T^i} - (w^*l_1 + pk_1) \left( \frac{1+r}{r} \right). \quad (8)$$

As  $\Delta T^1 < \Delta T^2 < \Delta T^3 < \dots$ , and  $1 = (pk_1 + wl_1)(1+r)\Delta T^j$  at the marginal land,

$$p_t^1 > p_t^2 > \dots > p_t^i > \dots > p_t^j. \quad (9)$$

At the marginal land,  $\Delta R^j = rp_t^j\Delta T^j = 0$ , so that,

$$p_t^j \text{ (price of the marginal land)} = 0. \quad (10)$$

Therefore, provided that the volume of agricultural produce  $X_1$  is fixed in the market in advance, the price of the unit of land  $p_t^i$  will decrease in accordance with its fertility being deteriorating. For the marginal, most inferior land, the price of agricultural product covers only the capital invested to wages (=wage fund) and input materials, and no rent will be realized. Consequently, there, for the marginal land, the price of land becomes zero in the end.

#### 6-4. The Relation between the Relative Price and the Profit Rate

We proceed to the analysis of the relation between the profit rate  $r$  and the relative price of the manufactured good  $p$ . From the price equation (7),

$$p = \frac{(1+r)w^*l_2}{\{1-k_2(1+r)\}}, \text{ differentiate this with } p \text{ and } r, \text{ and we get}$$

$$dp = \frac{w^*l_2 dr}{\{1-k_2(1+r)\}^2}, \text{ therefore, } \frac{dp}{dr} > 0. \quad (11)$$

For the additional rent included in one unit of agricultural product  $\Delta R^i$ ,

*we differentiate  $\Delta R^i = 1 - (pk_1 + wl_1)(1+r)\Delta T^i(X_1)$  with the profit rate  $r$  at  $X_1^i$ ,*

*and get  $d(\Delta R^i) = -dr\Delta T^i \left\{ (pk_1 + w^*l_1) + \left( \frac{dp}{dr} \right) (k_1)(1+r) \right\}$ .*

$$\text{With } \frac{dp}{dr} > 0, \frac{d\Delta R}{dr} < 0. \quad (12)$$

We could find that if the rate of profit  $r$  increases, the relative price of manufactured goods,  $p$  will increase, too, and on the contrary, the increase of the rate of profit  $r$  and therefore, that of

the relative price  $p$  has the negative correlation to the value of rent,  $\Delta R^i$  and  $R (= \sum_{i=1}^j \Delta R^i)$ , and the price of land,  $p_t$  (see the equation (8)).

$$dr > 0 \rightarrow dp > 0 \rightarrow dR < 0 \quad (13)$$

The gain of landowners, including the hike of the price of land, is in opposition to the profit of capitalists and entrepreneurs.

Turgot's price system cannot be closed on the supply side alone. The determinations of the levels of profit rate,  $r$ , of the price of land,  $p_t$ , and of the relative price  $p$  are still open, and they are placed to the demand side on the stock market and on the commodity market.

#### 6. Concluding remarks ——— Quesnay, Turgot, and Smith

Quesnay believed that the fundamental value (= production cost) would not contain the net product, which corresponds to rent. For Quesnay, the fundamental value works as a floor price, below which the market value cannot fall for a long time or no net product would be generated. "Bon prix" which should be higher than the fundamental value will ensure the high and sufficient rent to landowners. For Turgot, a fundamental value would correspond to the cost of production.<sup>7</sup> He argued that absolute free competition should be ensured in all markets, and then, all sectors, including the investment in land should take the equalized profit rate. He treated any kind of economic activities without any discrimination.

It is astonishing that Turgot knew thoroughly how to calculate the discounted present value of land. However, the rent itself in each land would be left unknown until the size of demand for agricultural product in the market is realized. He put forward the idea on the market mechanism, and thought that the market value would be formed through the forces of the seller and the purchaser. However, in the long run, it should tend towards the fundamental value, the cost of production. Turgot's idea regarding the relationship between the market value and the fundamental value looks similar to that between the market price and the central (or natural) price of Adam Smith.

Above all, one of the most prominent ideas of Turgot is, the concept of 'capital'. There are some indications that he viewed the substance of capital as money. Capitalists and entrepreneurs can manage any business and invest in it, but to do so, they have to prepare money in advance. Consequently, through the competition of capital among any kind of economic activity, rates of profit will tend to be equalized.

In Smith's 'advanced society', rent, wages, and profit play an equivalent role in making up the price of agricultural product (Smith 1976 [1776]: chap.6). However, at the same time, he assumes that rent would play a different role in forming the price of an agricultural product than would wages and profit:

High or low wages and profit are the causes of high or low price; high or low rent is the effect of it (Smith,1976[1776], p.147).

Eventually, for Smith, rent plays a passive role in price determination, because its existence and the amount depend on whether the price of the agricultural product is able to increase beyond the sum of wages and normal profit. Rent has no part in the determination of, at least, the relative price.

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<sup>1</sup> In fact, Turgot met both Quesnay and Smith.

<sup>2</sup> Under the rule of Louis XV, the national finance went bankrupt five times.

<sup>3</sup> It is well known that the editor, Pierre Samuel Dupont made not a few modifications on the original text.

<sup>4</sup> Vaggi(1987) insists that in Quesnay's system, entrepreneurs in agriculture could enjoy positive profits.

<sup>5</sup> '[A]t all times the desire of commerce among all the nations has been expressed by those two words: *freedom* and *protection*, but above all freedom. M. le Gendre's phrase to M. Colbert is well known: laissez-nous faire' (Turgot, 1759: 40). According to the footnote 29 in the same page, M. le Gendre is possibly François Legendre, author of *L'Arithmétique et sa perfection selon l'usage des Financiers, Banquiers, et Marchands* that was published between 1657 and 1687.

<sup>6</sup> On John Law and his activities, see chapter 3 of A. Murphy (2009).

<sup>7</sup> For Turgot, the cost of production included 'les frais de la matière première, intérêt des avances, salaires du travail et de l'industrie'.