Izumi Hishiyama and His Thoughts on the Circular Process and the Prices of Production:
The Journey of Economics from Quesnay to Sraffa

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Abstract:
Izumi Hishiyama, born in Tokyo in 1923, studied and taught at Kyoto University during most of his career after coming back from World War II. His studies can be split into essentially two fields. The first is his examination of the theories of physiocrats represented by Quesnay and of classical economists such as Ricardo, and Sraffa’s economics that aimed at the revival of the classical economics into the modern economic science. The second is his study of the Cambridge School, led by Marshall and Keynes, which is considered one of the main streams of modern economics. Hishiyama always tried to keep overall views, such as classical and modern, and orthodox and heterodox. He played an active role in leading Sraffian economics in Japan, introducing Sraffa’s famous paper on the cost of production, “Sulle relazioni fra costo e quantità prodotta,” with his own original introduction, as well as the masterpiece, Production of Commodities by Means of Commodities. Hishiyama is well known abroad for his pioneering work on Quesnay’s Tableau Fondamental, called “zig-zag,” which was written in 1960. Here, Hishiyama succeeded in distilling the formulae that depict the main message in “zig-zag” (Hishiyama 1960). Another of Hishiyama’s well-known works is his study of the relationship between Keynes’ first painstaking work, A Treatise on Probability, and Keynes’ later work, The General Theory (Hishiyama 1969). Here, Hishiyama argued that the system described in A Treatise on Probability should be regarded as an essential element of Keynes’ thoughts, being coupled with the system in The General Theory.

Hishiyama’s work on economics is, in a sense, unique and original, even from a global perspective. At first glance, his writings appear very academic and professional. However, after reading them, we learn that it is possible to study economics from a much deeper point of view than is typically the case.

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I Academic Life of Izumi Hishiyama

Professor Izumi Hishiyama (1923–2007), born in Tokyo, started his academic career at Kyoto University after returning from World War II. There, he studied physiocratic economics, the classical economics, the Cambridge schools, and in particular, Sraffa’s cost analysis. He set forward his study under the guidance of Seijiro Kishimoto and Hideo Aoyama, and had many excellent colleagues, including Michio Morishima, Nobuo Okishio (Kobe University), and other brilliant scholars of his generation.

Hishiyama was a typical professional academic, with a talent for integrating economics, history, philosophy, and natural science. While he studied physiocracy, other academics at the time at Kyoto University included Takeo Kukabara and Kenji Kawano, who studied 18th century France, and especially the French Revolution. In addition, he stated that he was greatly indebted to Akiteru Kubota. Kubota wrote many excellent papers on physiocratic economics and its philosophical foundations (Kubota 1958), and was one of the original organizers of the Japanese Society for the History of Economic Thought. After introducing Sraffa’s early works1 and Quesnay into Japan in the 1950s, Hishiyama studied Ricardo’s On the Principles of Political Economy and Taxation, which had an introduction by Sraffa who was the editor of The Works and Correspondence of David Ricardo.2 He then translated Sraffa’s famous book, Production of Commodities by Means of Commodities (hereafter, Production of Commodities) with his friend, Hiroshi Yamashita, in 1962. He was nominated to be an associate professor of Kyoto University in 1957, and a professor in 1967 after receiving his Ph.D. for his work, An Inquiry into the Physiocracy and the “Tableau Économique” in 1962. It was in 1984 that Hishiyama invited one of his closest friends, professor Luigi L. Pasinetti to Kyoto University to present lectures on his theory of production and the vertical integration of the input–out system. The latter theory was one that Pasinetti devoted himself to at the time, and had just published a book on the subject.3

Hishiyama took a great interest in the circular process (i.e., the system of reproduction within the economy), as well as the monetary aspects of the econ-

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1 Hishiyama translated Sraffa’s paper (1925) into Japanese directly from the original written in Italian (1956). And in its interpretation, he tried to give his own suggestions with regard to Sraffa’s contention that the cost of production should be constant to scale if firms operate under the condition of free competition, comparing it with Sraffa’s study on Ricardo that appeared in the introduction of Ricardo’s Principles (1951) edited by himself.
2 It was in 1979, that he finally published a book on Ricardo. In the preface of Hishiyama (1979), he wrote that he became interested in Ricardo in the 1950s.
3 Hishiyama translated Sraffa’s paper (1925) into Japanese directly from the original written in Italian (1956). And in its interpretation, he tried to give his own suggestions with regard to Sraffa’s contention that the cost of production should be constant to scale if firms operate under the condition of free competition, comparing it with Sraffa’s study on Ricardo that appeared in the introduction of Ricardo’s Principles (1951) edited by himself.
omy. He was particularly interested in how an economy develops and why it sometimes has serious difficulties, such as bankruptcies and unemployment. As a result, he studied the work of Keynes in great depth. Hishiyama did not support the neoclassical approach that believes in the automatic adjustment mechanism of demand and supply built into the market economy. Nevertheless, he taught Walras, Marshall, Wicksell, and other important neoclassical economists, including Samuel Hollander, who wrote many books and articles on classical economists from a viewpoint somewhat biased toward the marginalists (Hollander 1979). In that sense, Hishiyama was a fair-minded professor.

He also read Karl Marx and Antonio Gramsci (Hishiyama 1993b*, 213–57), but it is not clear whether he was influenced by these revolutionary thinkers, and if so, to what degree. In addition, he studied pre-classical economists other than physiocrats, as well as the philosophies and political thoughts of the 18th century, including Cantillon, Forbonnais, Locke, Hume, Montesquieu, Malebranche, Mercier de la Rivière, and so forth.

After retiring from Kyoto University in 1987, he held the positions of professor at Osaka Sangyo University and at Fukui Prefectural University, and was the president and governor of Kagoshima International University between 2001 and 2007, before dying of lung cancer.

Before presenting Hishiyama’s contribution in detail, I provide an overview of his thinking. He appreciated Quesnay, and believed that the Tableau Économique was Quesnay’s great invention and his gift to economics. The work first showed the circular flows of products produced in one year and of money among the people of three classes in a country. Hishiyama emphasized the role of landlords’ expenditure from their revenue (produit net), which initiates the annual cycle of the economy. He also noted that, despite the general meaning of the Tableau Économique and its popularity fading among economists in the 19th century, Karl Marx learned directly from Quesnay’s “formule” that the system of reproduction is a circular process:

It seems to me to be impossible to find a similar case of a 19th century economist who has brought into his basic theory Quesnay’s fundamental view, i.e., the specification of the objective condition of transactions

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3 See Pasinetti (1981). During his visit to Kyoto, Pasinetti was so kind to students surrounding him, that the author was also pushed to submit my paper on the theory of gravitation to some of academic journals. See Kuroki (1986).

4 On this point, Pasinetti gave an interesting suggestion to the author who visited Università Cattolica del Sacro Cuore in 2004, saying “Look at the case of Mussolini! He was once a sympathizer of the Communist Party! The Left and the Right could coincide in some cases, and in fact, the truth could be in between.”
techniques) for viability within a system composed of the two great macro-sectors.

(Hishiyama 1994b)

According to Hishiyama, we can easily see the fundamental feature common to the "zig-zag," the "précis," and the "formule." This feature is "the mechanism in which the outputs of the two macro-sectors (agriculture and industry) are determined in accordance with the exogenously given 'final demand,' i.e., the expenditure of landowners' revenue" (Hishiyama 1994b). He continues, "such a determination mechanism of outputs is similar to the so-called 'final demand'-oriented approach formulated by Keynes and Leontief, which consists of determining the macro incomes or sectoral incomes through the aggregate expenditures or the final demands allocated to each sector" (Hishiyama 1994b).

We can see two lines of thought, even in modern economics, derived directly from Quesnay. The first is the determination of quantities, led by Keynes and Leontief, and the second is the determination of prices of production, as studied by Sraffa.

II Hishiyama’s Early Works on Quesnay and Physiocracy

1. Influence of August Oncken

In the 1950s, Hishiyama began studying Quesnay and the Tableau Économique, as well as the French economists of the 18th century. He studied Quesnay and physiocratic economics, translating works into Japanese in 1951–1952. He introduced the interpretations of Quesnay put forward by Max Beer, August Oncken, and Georges Weulersse, and compared their studies (Beer 1939, Oncken 1922, and Weulersse 1939). According to Hishiyama,

(1) Beer thought that Quesnay tried to show a kind of conceptual model of the principle of medieval society based on a scholastic outlook, which was oriented by the natural law, à la Thomas Aquinas, rather than a realistic description of the French economy in the 18th century.

(2) Oncken collected Quesnay’s writings, and tried to reconstruct his system with logical consistency. According to Oncken, the physiocrats aimed to build a synthetic science founded on a solid base of economic science. At the same time, Oncken believed their approaches had a practical characteristic of studying physical economic problems.

Beer tried to find the basic ideas of physiocrats in the medieval outlook of theology. However, Oncken saw its crux in early-modern Cartesian philosophy. Hishiyama took Oncken’s view, and believed that farmers in the Tableau, the productive class according to Quesnay, were the leaders of the agricultural revolution in Northern France, which seemed to be influenced by the large-scale
The main purposes of the Tableau are as follows:

1. Quesnay focused on the capitalistic operation of French agriculture and the establishment of capitalistic tenant farmers. These farmers invest capital in agriculture and expand the scale of cultivation using advanced technology. This reduces costs, increases returns, and brings about growth in the net produce.

2. He provided the role of a capitalistic-oriented market mechanism by classifying society into three classes, which organize commodity exchange markets, and by understanding the concept of an open-market system that would bring free competitive prices.

3. He had, in a sense, a deep insight into how the capitalistic labor market works, and claimed there is a minimum wage for workers’ subsistence upon which the capitalist economy will survive. At that time, French farmers were suppressed by a double burden. On the one hand, they were restricted to being peasants (i.e., small-scale farmers) under the remnants of feudalism. On the other hand, they suffered under state policies of mercantilism that protected the profits of manufacturing industries. French farmers should have been raised to the position of independent agricultural entrepreneurs, or tenants who organize capitalistic large-scale farming.

2. The Age of Physiocrats

In Quesnay’s time, confronted with financial difficulties and bankruptcy, many aristocrats were inclined to marry into the wealth of common people. Victor Riqueti Mirabeau wished to remove such mésalliance, saying that the custom would destroy the social hierarchy. Regarding his request, Quesnay reasoned with him as follows:

As the dignity of aristocrats is founded on wealth, . . . when the wealth leaves aristocrats, the wealth itself will dominate the most prestigious position before long. Therefore, to keep their dignity, rich common people should be promoted to a higher position so that aristocrats would absorb their wealth. (Hishiyama 1962*, 22)

Then, as a result of Colbertism, which protected rich merchants, French aristocrats were ultimately ruined.

The French absolute monarchy did not allow marriage with wealth (mésalliance). As a result, the power of aristocrats weakened and they had no option

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5 On the thoughts of Beer and Oncken, see Hishiyama (1962*), chapter 1.
but to obey the monarchy. However, such policies were likely to ruin the aristocracy and destroy the system of monarchy itself. In the end, aristocrats were admitted to marry rich land owners (richesses foncières) to revive aristocratic economic conditions.

3. Bourgeoises

The highest group of bourgeoisies was formed by the class who seized a huge fortune through state finance. They were called haute bourgeoisies (upper class bourgeoisies), or bourgeoisies financières. Alongside them, were business monopolies such as manufactures réunies (privileged manufacturers) and bourgeoisies corporatives (bourgeoisies of trade association), who were protected by Colbertism. In the 18th century, manufactures dispersées (decentralized manufacturers) appeared mainly in rural areas, and started to think of the monopolistic regulations as obstacles.

Quesnay attacked the bourgeoisies financières sharply and opposed their holding fortunes pécuniaires (monetary fortunes). He criticized Colbertism saying that the state finances, which were in collections or government expenditure, should not keep monetary fortunes in storage (Quesnay 1888, 337). He reasoned that forming monetary fortunes would have a negative effect on investment in agriculture, and the capital would be withdrawn from the reproduction process pictured in the Tableau Économique (Hishiyama 1962*, 26).

There is a miserable country where almost as many factories of luxury products are protected by monopolistic privileges and people are suffering from being prohibited from using other manufacturing goods produced somewhere else. We should not forget that a minister of the last century... threw our country into a dream where only money and trade speak without thinking about what the true use of money or the true trade of a country would be. (Hishiyama 1962*, 26, Quesnay 1888, 140)

4. The System of Agriculture of the ancien régime

Even though physiocrats could form a common front with the rising bourgeoisies against the old conservatives, the French agriculture of the ancien régime was not the capitalist, large-scale farming system employing many workers already seen in England, nor was it a large-scale system managed by a landlord employing slaves. Instead, it was characterized by small-scale farming with very low productivity. Most of the propriété paysanne system comprised the régime

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6 This minister is considered to be Jean-Baptiste Colbert (1619–83).
de la petite propriété by the paysans insuffisants. In the northern part of France, large-scale farming based on fermage made progress, but in the center, south, and west of France, feudalistic tenant farming (métayage) were predominant. As a result, it was quite natural for Quesnay to think that the most desirable system of farming was capitalistic large-scale farming with very high productivity.

5. The System of Public Finance

Until the reign of Louis XIV Le Grand and Louis XV, the proportion of direct tax and indirect tax was almost even. However, the privileged classes such as aristocrats and priests were usually exempt from direct tax, which meant that burden was carried by farmers:

In short, the system of public finance of the ancien régime was a kind of device that exploited money from farmers and put it into the hands of extravagant aristocrats. Furthermore, the royal family and the court nobility were facing bankruptcy. What was the main cause of such a crisis of public finance? This was one of the essential issues Quesnay was confronted with. (Hishiyama 1962*, 34)

Another reason could be seen in the fashion regarding agriculture of the time. That is, in the 18th century, people believed the natural and primitive agricultural society was ideal, and criticized luxurious urban cultures (retour à la nature!). Then, the new English-style farming and the science of agriculture were introduced into France, in which even Mme. Pompadour became interested (Quesnay 1888, 337).

However, the more crucial point was the collapse of the so-called system of John Law and people’s disgust with its economic thought. By the end of the era of Louis XIV, the national treasury was almost bankrupt by long years of war. Then, John Law came to France (on Law’s thinking, see Murphy 2009, chapter 3).

John 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 French absolute monarchy. Hishiyama summarized John Law’s idea as follows: “The stock of metallic currency is of no use if it does not circulate actively. Paper money, without having any intrinsic value, is the most convenient vehicle to realize the maximum velocity of circulation” (Hishiyama 1962*, 37).

After the success of the Banque Générale founded by Law, he established the system of mega-enterprises, including le compagnie française des Indes occidentales, the capital of which was allocated to redeem the public bond. Before
long, weakness dominated the market so that the equity of the French India Company collapsed. By the end of 1720, even bank notes gave up the position of being legal tender.

Hishiyama suggested that the thinking of the 18th century concerning credit was strongly influenced by the breakdown of "the system of Law," and referred to Charles Rist’s view: "The main reason why Smith, Hume, or Turgot ignored the role of money was not due to mercantilists, but because they opposed Law’s paradox." (Hishiyama 1962*, 39, and Rist 1938, 20–46).

The collapse of 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 of the reality of wealth. In fact, with the hyperinflation provoked by the further issuance of paper money, the enthusiasm of the people about credit turned to disgust, and their fanaticism switched to distrust. There was no more certain revenue than that brought from the land. Thus, after the storm of Law, only landed property survived. People now believed the property of land to be eternal, and went to farming. Hishiyama referred to Adolphe Blanqui and concluded that this was the background to the first appearance of the "economist," namely the physiocrats (Hishiyama 1962*, 40–41).

6. On the Idea of Natural Law

The law of nature à la Quesnay is the law of nature characterized by physis in Greek philosophy and moral science, namely that economic society works for its own sake. According to Hishiyama, this idea contrasts sharply with Colbertism, and concluded that society ought to be controlled carefully by the state through planning. The economists believed that 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. The Tableau Économique, which tried to demonstrate that the national economy could reproduce itself autonomously under free competition, was considered to show the natural order of society (Hishiyama 1962*, 135). Physiocrats saw it all as the natural "reproduction créatrice." They thought of the economic system as one of reproduction. Under such a natural order, "la reproduction se perpétue par les dépenses, et les dépenses se perpétuent par la reproduction." (De la philosophie rurale, in Quesnay et la physiocratie (1958), tome II, 696, and Hishiyama 1962*, 164). Hishiyama noted that the original source of Quesnay’s ideas regarding the natural law and the “évidence” could be found in the ideas of Malebranche, who is included in the school of occasionalism rather than the idea of pre-established harmony, à la Leibniz. God, making human labor the “cause occasionnelle,” generates reproduction (Hishiyama 1962*, 154, 172).
III  Quesnay’s Theory of Value and Prices

1. A Definition of Wealth

Quesnay wrote:

“Les revenus sont le produit des terres et des hommes. Sans le travail des hommes, les terres n’ont aucune valeur.” (Quesnay 1888, 220)

However, at the same time, Hishiyama did not forget Le Trosne: “Human labor without the land must be sterile. For, humans are not creative” (Hishiyama 1962: 150, Le Trosne 1846, 942). Therefore, both human labor and land are indispensable to creating wealth.

First, in Quesnay’s writings, there is a clear definition of value and prices as a premise of wealth. That is, goods (biens) must have use value (valeur usuelle) and market value (valeur vénale) before they are referred to as wealth. Therefore, there is little difference between physiocrats and the classical schools with respect to the premise of wealth.

2. Physiocratic Dichotomy in Price Determination

Hishiyama starts his argument by emphasizing a striking characteristic of Quesnay’s price system that consists of a dichotomy between the determination of the price of agricultural products and that of manufactured goods. A premise of the price dichotomy can be seen in the peculiarity of physiocracy, namely that agriculture is considered to be productive in the sense of generating net product, whereas, manufacturing is unproductive and sterile because it does not generate any net product (produit net) (Hishiyama 1993a, 71).

The fundamental idea is that the price of agricultural products is such that it should be above and independent of the cost of production, while the price of manufactured goods is regulated according to the cost of production under market competition.

The highest level of the market value (valeur vénale) of “wheat” under free competition is called “bon prix,” which is the same as “cherté,” or “haut prix.” For Quesnay, “bon prix” is the alpha and omega of “la science économique.” With this highest market value of wheat, agriculture can generate a net product, or surplus value above the cost of production.

In the case of manufactured goods, the price is regulated by the cost of production. The process of production within the manufacturing industries could not generate any net product, because it only metamorphoses agricultural materials into manufactured goods. That is, it merely produces manufactured
goods with a value that is the same as that of the materials.

The realized net product, which should be passed on to the landlords, is never generated in a market exchange, because Quesnay believed that an exchange is nothing but an exchange between equivalents. Therefore, the problem of the highest value (bon prix) that creates surplus value above the cost of production is, according to Hishiyama, in a sense concerned with the so-called “realization problem.” That is, it is the problem of whether the surplus products could be realized in the “circulation” of annual reproduction depicted in the Tableau (Hishiyama 1993a, 75).

3. Factors that Determine the "bon prix"

What determines the "bon prix"? In the Tableau, Quesnay does not give it as an endogenous variable calculated within its reproduction system. Rather, he assumed the "bon prix" to be constant from the beginning to the end of the reproduction process, and emphasized the importance of free trade that determines the level of "bon prix" that could generate the net product of land.

For Quesnay, only the absolute freedom of trade could establish a uniform price. In other words, a uniform price is set by the equalization of the price of the seller and the price of the purchaser/consumer in one nation, as well as in all markets throughout the world. This is the presumption of the "bon prix," which generates the net product.

Then, what factors determine the "bon prix"? Hishiyama suggests that Quesnay would be ambiguous and even irresolute to single out certain basic factors that uniquely regulate the "bon prix" (Hishiyama 1993a, 77). To find such factors, Quesnay did not bring up the exchange market. The market value (valeur vénale) is to be determined in advance of an exchange, at the level of the international trade market. Hishiyama concluded that Quesnay was unable to complete his theory of value (Hishiyama 1993a, 78).

IV Turgot and Smith as Critics and Reformers of Physiocracy

Hishiyama presents Turgot’s and Smith’s views that clarify the ambiguous point of physiocracy.

Turgot, who was the reformer of physiocrats and, at the same time, the forerunner to Adam Smith, appears at first glance to hold the same view as Quesnay. That is, a fundamental value (une valeur fondamentale) implies the costs of production (les frais de la matière première, intérêt des avances, salaires du travail et de l’industrie). In addition, while Quesnay urged free trade, for Turgot, absolute free competition should be guaranteed in the market as well.
However, Hishiyama pointed out that, with respect to market value, Turgot put forward the idea of the function of supply and demand in the market, and thought that market value would be formed through the forces of the seller and the purchaser.

For Turgot, the market value is regulated by the demand and supply of products and is likely to fluctuate. However, in the long run, the market value is a value that should tend towards the fundamental value (i.e., the cost of production). For Hishiyama, 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 price, in other words, the natural price à la Smith and the classical school.

In contrast, according to Hishiyama, Quesnay believed the fundamental value 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. It was considered desirable for the market value to go beyond the fundamental value so as to realize the net product.7

In Smith’s “advanced society,” rent, wages, and profit compose the price of the produce of land. For Smith, rent, wages, and profit play an equivalent role in making up the price of an agricultural product (Smith 1776, chapter 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. That is, rent “enters into the composition of the price of commodities in a different way from wages and profit. High or low wages and profit are the causes of high or low prices; high or low rent is the effect of it” (Smith [1776] 1976, 147). According to Hishiyama, Smith “clarifies that in the determination of the price of wheat, rent will occupy the opposite end to wages and profit in the causal nex-

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7 Hishiyama (1993a, 81). Hishiyama said that he was so impressed by G. Vaggi’s argument on Quesnay’s economics that he decided to write this article. Vaggi (1987) recognized a profit opportunity in agriculture and suggested that the rent should be contained in the fundamental price and the difference between the bon prix or the current price and the fundamental one turns into the profit of farmers. Hishiyama criticized his argument saying that the fundamental value does not have the rent as a part of costs and the excess of the market value (le bon prix) over the fundamental value (the cost of production) could generate the rent as the net product. I quote from “Hommes”: “Ce n’est pas simplement les productions qui forment les revenus: en effet, elles peuvent être fort abondantes et ne pas produire de revenus: car si le prix qu’on les vend n’est pas au-dessus du prix fondamental qu’elles coutent, elles dégénèrent en perte pour les cultivateurs, elles ne produisent donc des revenus qu’autant que leurs prix surpassent les frais, ou les dépenses qu’elles exigent.” Here, “le prix fondamental” is the same as “les frais,” or “les dépenses.” See Quesnay (1958, tome II, 534–35).
us” (Hishiyama 1993a, 82).

For Smith, rent is assumed to play a passive role in price determination, because its existence and extent depend on whether the price of the agricultural product is able to increase beyond the sum of wages and profit. “Rent has no part in the determination of the price” (Hishiyama 1993a, 82).

Smith’s view on rent is that “if the ordinary price is more than this (i.e., the cost of production including ordinary profit (by the citator)), the surplus part of it will naturally go to the rent of the land,” which is quite similar to the view of Quesnay. The difference between them with regard to the main factor that determines the market value to generate rent is, if any, that Quesnay saw it in free trade (i.e., universal free competition), while Smith insisted that demand is indispensable to keeping the market value over the cost of production.

V Ricardo on the Theory of Rent

For Quesnay, rent is one of the main factors that constitute the market value of an agricultural product in free competition. Even though rent is the effect of, and depends on the price of the agricultural product in the free competitive market, the amount of rent, or the volume of revenue has a one-to-one relationship to the price level.

In contrast, Ricardo believed that rent does not have any crucial role in fixing the price level. Ricardo claims that the value of land produce is controlled and determined by the productivity of the most inferior land, and since that land does not generate any rent, the main factors determining the price should be wages and profit.

To simplify this, suppose that one unit of labor generates one unit of agricultural product on the most inferior land, and that the wage rate, \( w \), is less than the unit price of the agricultural products, \( p_1 \). According to Ricardo’s theory of differential rents, the most inferior land does not provide any rent, and the profit per unit of product, \( \pi \), brought to farmers is \( (p_1 - w) \). A unit of labor hired on land more fertile than the unproductive boundary land will produce more than one unit of product. Therefore, the excess over a unit of products will go to the landlord.

The uniform rate of profit, the level of which is considered ordinary, is realized through the free competition of capital in the industrial sectors, and governs the price of produce from land, along with the uniform wage rate. As a result, rent, or more precisely, differential rent, is dependent on the soil’s fertility.

Ricardo rejected the physiocratic notion and Smith’s idea of rent, considering that the formation of the prices of agricultural products and manufactured products are not distinguishable. Therefore, they are governed by the same rule,
namely the principle of costs of production. Hishiyama concluded that Ricardo’s rejection implied the final resolution of the dichotomy in price-determination, and the end of physiocracy.

VI Modern Appraisal of Sraffian Economics

Hishiyama argued that the original source of Sraffa’s idea could be found in Quesnay and Ricardo. In addition, Sraffa wished to build a bridge between the Quesnay-type (and Marxian) reproduction scheme and the Ricardian theory of value in a multi-sector framework (Hishiyama 1994a, 103). In the Tableau économique and Marx’s reproduction scheme, Quesnay and Marx endeavored to find the relation between sectors that assures the productive process being repeated every year. In short, they tried to find a system for an economic society that continues its own reproduction on the assumption of constant values in a two-sector model.8

The method of production in the economic system depicted in the Production of Commodities determines a unique set of prices that make it possible for the productive process to be repeated annually (Hishiyama 1994a, 104). If we indicate the input–output matrix by \( A \), elements of which are composed of the coefficients of production, \( a_{ij} \), and a row vector of direct labor input coefficients by \( a_n \), we have the following:

\[
pA(1 + r) + a_nw = p
\]

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\{ A, r \} \rightarrow \{ p, w \}.
\]

When a unique rate of profit, \( r \), is predetermined, a unique set of prices, \( p \), and the wage rate, \( w \), will be set from the given methods of production. Hishiyama always emphasized that in the capitalist economy, the capitalist class leads price formation. Therefore, the rate of profit, rather than the wage rate, will be predetermined.

It is well known that Sraffa refused the Marshallian principle of diminishing returns to scale, and insisted on constant returns. At the same time, he never accepted the Marshallian notion of the long term. Sraffa’s period is supposed to be a year, which might be taken from the idea of the classical school. That is, it is premised on the period of a cycle of agriculture. On the other hand, Hishiyama mentioned Garegnani, who seems to assume that a period of production is based on the period in which the temporal market price is adjusted to the so-called central price. However, as the self-adjusting process of the market price to the central price with a uniform rate of profit never appears in the Production of Commodities, Hishiyama concluded that “such a ‘process of gravitation’ is not

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assumed in Sraffa’s system of production” (Hishiyama 1994, a, 106). Rather, in the Sraffian system, the assumption of a uniform rate of profit and the input–output system play the role of a logical and necessary premise to bring about so-called prices of production.

Sraffa’s aim, which is consistent from “Sulle relazioni fra costo e quantità prodotta,” via his introduction to the Works of Ricardo, to the Production of Commodities, was to revive the ideas of the old classical economics and to rebuild them as the basis of the modern economic analysis.

Although Sraffa inherited the theory of value directly from Ricardo, he derived the idea of the mode of production from Quesnay’s Tableau Économique and Marx’s reproduction schemes simultaneously. That is, he tried to integrate the reproduction system as a circular flow, the original idea of which is seen in Quesnay’s Tableau, with the classical economics.9

According to Hishiyama, Sraffa was always critical of analyzing economic phenomena by relying on the device of equilibrium between supply and demand, both in terms of the Marshallian partial equilibrium approach and the Walrasian general equilibrium approach. He concentrated on the reciprocal relationship between inputs and outputs connecting production processes of various commodities, such as a combination of a process of consuming iron to produce wheat and a process of consuming wheat to produce iron, rather than on the relationships among the markets of factors and commodities.

Walras tried to build a theory of price formation under the hypothetical system of perfect free competition. Here, economic agents are consumers and producers who, led solely by market prices, act to maximize their utilities or profits, given constraints such as budgets and cost structures. First, under arbitrary prices, each individual or producer seeks the most favorable position and attains it as a result of his rational behavior. As is well known, this is called the condition of subjective equilibrium. Next, social (or market) demand and supply are derived by aggregating the demand and supply of such microscopic agents. If excess demand, $ED$, is a monotonically decreasing function of the market price, $p$ (i.e., $ED' < 0$), and the price reacts positively to excess demand (i.e., for $\alpha > 0$, $dp/dt = \alpha ED$), then the objective equilibrium (i.e., the market equilibrium) is finally achieved from the price adjustment.

However, in the Quesnay or Sraffian economy, there exists a structure of reproduction, constrained by the prevailing technology at a certain point in time.

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9 The classical school is, generally speaking, weak at thinking of the system of reproduction. Hishiyama always said in his lectures that the classical school thought of the mode of production like the straight “chimneys,” whereas physiocrats considered it like the “mesh, or net.”
The production of commodities is correlated reciprocally through the technical network of input and output, and no price can be determined by its own supply and the demand. Instead, the price is determined by the correlation with the production of other commodities (Hishiyama 1993b*, 14). Whereas the characteristic of the technology for the neoclassical school could be captured as “one-way from factors of production to consumer goods,” the Sraffian production process is a circular process in which commodities are expended as inputs and produced as outputs, as Quesnay did in the Tableau.

Sraffa believed that the physiocratic views of reproduction acted as the compost in building his own economic system with their principle of “produit net.”

VII Hayek and Sraffa: The Money Rate of Interest that Governs the Natural Rate of Interest

Sraffa was actually a specialist of the monetary economy as well. His first work in this area was “Monetary inflation in Italy during and after the war,” in 1920. Here, he claims that the value of money is perfectly arbitrary, and criticizes the tight money policy.¹⁰ In this case, Sraffa’s idea of money was similar to that of Keynes, as argued in his Tract on Monetary Reform,¹¹ which Sraffa translated into Italian (As a result of his “Italian Banks Today,” which appeared in The Manchester Guardian Commercial: Reconstruction in Europe, December 7, 1922, Sraffa was persecuted by Benito Mussolini).

We do not refer to Sraffa’s significant contribution to the so-called Cambridge cost controversies¹² in this paper, but will present his view on the natural system of the economy. As we examined above, Sraffa inherited the concept of

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¹¹ Keynes’ argument on the exchange rate of the forward market in chapter 3 of Keynes (1923) reminds us of Sraffa (1932a, and 1932b) and also of capter 17 of the General Theory.

¹² Sraffa (1925). This article aims at the revival of the idea of constant cost of the classical school, being based on the critical assessment of the law of increasing cost à la Marshall. To derive the cost curve which is non-proportional to scale, we need to isolate the industry under-consideration perfectly from other industries. However, it will be impossible to consider the cost structure excluding relations with other industries. Therefore, although the Marshallian partial equilibrium analysis could be an approximate approach to the real economy, it should be admitted that commodities are produced under the condition of constant cost in general.
a natural system, characterized by the objective technical relation of production, from Quesnay and the classical economics. However, was he really an economist who was interested only in the real economy? One of the answers to this can be found in a debate with Hayek.

In his two famous papers on Hayek’s Prices and Production (Sraffa 1932a, and Sraffa 1932b), Sraffa argues the adjustment process of the market price to the natural price (i.e., the central price) within the Wicksellian monetary economy framework. Hayek also admitted the monetary influence on the volume and direction of production. However, what he eventually did was to reconcile reality and the neoclassical theory, which asserts that, in the long run, there exists one interest rate, and that the natural rate will equilibrate investments and savings. According to Roncaglia (2009):

Hayek elaborates an analysis of the “dynamics of disequilibrium” with particular reference to situations where the “monetary” rate of interest diverges from the “natural” rate (as understood by Wicksell, 1898), focusing on the effects of monetary perturbations on the relative prices of consumption goods and producer goods. (Roncaglia 2009, 32)

The point of Hayek’s argument is that a monetary, or a market rate of interest below the natural rate will cause forced saving in the phase of inflation in good times, which brings an over-accumulation of capital. Increased income, led by the producer goods sectors, causes greater demand for consumption goods. Then, the change in relative prices in favor of the consumption goods will, in due course, destroy the profitability of the producer goods sectors and bring about the descending phase of the trade cycle (Roncaglia 2009, 33).

For Hayek, the rate of interest restored after a business cycle characterized by ascending and descending phases should not be artificial, but rather the natural rate. Even though there could be a different monetary rate of interest at each point in time, it must converge to the natural rate that reflects the actual profitability of the capital stock. Sraffa disagrees with Hayek’s view and presents the following idea:

When relative prices as a whole are not constant in time, there is no single “natural” interest rate to be compared with the money rate of interest: each commodity has its “own interest rate,” defined as the interest paid on the money necessary to buy at spot a unit of the commodity added to the (positive or negative) difference between spot and forward prices of the commodity, in percent. (Roncaglia 2009, 33)
The point of Sraffa’s contentions is that there must be as many natural interest rates as there are numbers of commodities, provided the natural rate represents the interest rate of the commodity. In addition, even after the market equilibrium is restored, eliminating the difference between spot and forward prices, there will be as many natural equilibrium rates of interest as there are money interest rates.

Actual profit rates should converge to a uniform rate over time, which is conceived as the natural rate by Hayek. However, for Sraffa, who was already skilled as a monetary economist at the time of the controversy with Hayek, the key factor was not the natural rate, but the level of the money rate of interest, which was somewhat artificial.

Sraffa also influenced Keynes, who struggled to bridge the difficulties seen in *Treatise on Money*, which was plotted and written when Britain was still under the system of the gold standard. When Keynes criticized the ideas of Ricardo on the relation between the rate of profit and the rate of interest in *The General Theory*, he must have felt an affinity with Sraffa. That is, he begins his judgment of Ricardo’s theory of the rate of interest by quoting from Ricardo’s *Principles*:

> "The interest of money is not regulated by the rate at which the Bank will lend, whether it be 5, 3, or 2 percent, but by the rate of profit which can be made by the employment of capital, and which is totally independent of the quantity or of the volume of money."

(*Ricardo [1817] 1951, 363 (Sraffa version), Keynes 1936, 190*)

Keynes writes, "the Ricardian theory is valid, in the sense that on these assumptions (that assure full employment in the long period—the citator), there is only one rate of interest which will be compatible with full employment in the long period." However, Ricardo “overlooks the fact that even in the long period, the volume of employment is not necessarily full, but is capable of varying, and that to every banking policy there corresponds a different long-period level of employment; so there are a number of positions of long-period equilibrium corresponding to different conceivable interest policies on the part of the monetary authority” (Keynes 1936, 191).

**VIII Keynes and Sraffa**

Keynes did not forget to write acknowledgments of Sraffa’s helpful comments in *The General Theory*, which Hishiyama always pointed out in his lectures, saying, “my friends, see the footnote that appears on page 223 of *The General Theory*. Do not forget that important messages are sometimes expressed implic-
itly in the margin such as a footnote.” Keynes’ unique idea on the relation between the own rate of interest and the money rate of interest finally bore fruit, especially in chapter 17 of *The General Theory* and the arguments on investment decisions (i.e., the marginal efficiency of capital) in chapter 11 and on the rate of interest in chapter 13. After being released from the gold standard, monetary economics, and above all, monetary policies settled by the central bank have become increasingly liberated from the system of global adjustment of the trade of gold. Indeed, according to Keynes’ confession, even he once believed that the main factor that rules market adjustments should be something natural. Hishiyama quotes the following from *The General Theory*:

In my *Treatise on Money*, I defined what purported to be a unique rate of interest, which I called the natural rate of interest—namely, the rate of interest which, in the terminology of my Treatise, preserved equality between the rate of saving (as there defined) and the rate of investment . . . I had, however, overlooked the fact that in any given society there is, on this definition, a different natural rate of interest for each hypothetical level of employment . . . I had not then understood that, in certain conditions, the system could be in equilibrium with less than full employment.

(Keynes 1936, 242–43; Hishiyama 1993 b*, 96)

Here, we extract the difference between the two views with respect to the relation between the rates of interest and profit. In what follows, small $r$ expresses the rate of profit, and $i$ is the money rate of interest:

For classical, and neoclassical schools: $r \to i$ (in equilibrium)  
(e.g., for Ricardo and even for Keynes until his *Treatise on Money*).

For Sraffa and Keynes after *The General Theory*: $i \to r$

For classical economists, and even for Keynes until his *Treatise on Money*, the main factor within our economy is not the interest rate, but the rate of profit, $r$. The rate of profit could be used as a barometer to prove the capability and the productivity of the capital within the economy. In contrast, for Sraffa and Keynes in *The General Theory*, it is the money rate of interest $i$, manipulated artificially by the monetary authority and, therefore, fixed exogenously from outside the economy, that governs the productivity of capital (i.e., the marginal efficiency of capital), and not vice versa.

Hishiyama did not forget to refer to Keynes’ contribution to the striking character of the modern capitalist economy either. Keynes believed entrepreneurs should lead industrial economies and develop them through their invest-
ment activities, which will bring greater capital accumulation to society. For entrepreneurs, the future is uncertain and unpredictable, or "non-ergodic," as noted by American post-Keynesian, Paul Davidson.\footnote{See Davidson (1994) chapter 6 and Davidson (2007) chapter 7 on "non-ergodic uncertainty."}

With regard to the uncertainty in future, Hishiyama did the pioneering work by claiming the close relationship between Treatise on Probability and The General Theory (Hishiyama 1969). He wrote that Keynes’ thought is to be summarized and reduced to two main fields: (1) logic based on probability, and (2) economics based on money (Hishiyama 1969, 26). These two lines, originating from probability and money respectively, could intersect, and Keynes’ systematized economic thought should be rebuilt on his logic of uncertainty. In particular, according to Hishiyama’s thought, "the theory of probability and the theory of investment inducement are directly related, and such a combination is very natural" (Hishiyama 1969, 27). For A. C. Pigou, who took over the idea of inductive logic and deterministic economics built upon mathematically calculable probability from J. S. Mill and A. Marshall, "the uncertainty that supervenes with a certain type of investment, . . . is to be manifested in its full play in a certain probability distribution of the expected gain of the investment. . . . Thus, investment cannot be anything more than getting possession of a certain probability distribution which is to be manifested in a scheme of prospective returns, by laying out a certain amount of money in a manner similar to the case of betting" (Hishiyama 1969, 33–34).

For classical economists, the uncertainty especially in "the field of investment" is mathematically calculable. "But Keynes is different." "According to Keynes, uncertainty prominent in the field of economics, . . . is a peculiar characteristic inherent not merely in economic phenomena but also in the structure of inference underlying empirical science, which is universally unavoidable in such human behavior that is being obliged to make alternative judgments of which the results will more or less show up in the future" (Hishiyama 1969, 36). In this sense, for Keynes, the future is literally unknown and unpredictable.

For Hishiyama, "the difference in the ways of thinking with respect to the concept of uncertainty and probability held by Keynes and the classical economists can be . . . seen in the theory of money and the rate of interest . . . . In other words, . . . this very difference is in itself an outstanding characteristic of the Keynesian theory of . . . investment" (Hishiyama 1969, 37–38).

According to Keynes, if we assume that the quantity of money is fixed, the interest rate is determined by the propensity of the public to hold money. "However, various motives of the public for holding money in possession for future
use are governed by the anticipation or judgment with respect to the future. On the one hand . . . the anticipation of future profit from capital goods is also to be governed by judgment having an uncertain element. Therefore, . . . if the production cost of capital goods is given, then investment after all is to be based on two different judgments with respect to the future—the preference of the public to hold money in possession and their opinion of the future profit from capital goods. Because these judgments are of an extremely uncertain nature, they are not based on safe and definite grounds” (Hishiyama 1969, 28).

Pasinetti writes on the uncertain future:

This (the word non-ergodic—citator) means that the future, though connected with the past, can never coincide with it. . . . Keynes stressed the role of uncertainty and the unpredictability of future events. Staffa thought that an evolving unpredictable economic system would have forced economic theory to take only still pictures of reality at a specific point of time, so as to avoid counterfactuals. Joan Robinson perhaps more than anybody else emphasized this characteristic by making a sharp distinction between historical time and logical time. (Pasinetti 2007, 225–26)

Hishiyama must share such ideas of Pasinetti, for he always said “Pasinetti is one of my closest and most respected scholars, especially after Sraffa died.”

In a world that does not repeat itself in a calculably anticipated future, entrepreneurs dare to organize production and determine the level of investments, creating genuine expectations of prospective yields that will arise from those investments. As Keynes depicted, essential difficulties with respect to the information upon which expectations of prospective yields are based lie in future events that can only be forecast with more or less confidence. The state of such long-term expectations depends not only on the most probable forecast we can make, but also on the confidence with which we make this forecast. In addition, this state of confidence decisively affects the marginal efficiency of capital, and therefore the amount of investments. The strong state of confidence that creates the long-term expectation of a future fall in the rate of interest, will have the effect of lowering the schedule of the marginal efficiency of capital. “Since it means that the output from equipment produced today will have to compete during part of its life with the output from equipment (installed in the future—the citator) which is content with a lower return” (Keynes 1936, 148). Therefore, the state of confidence with the long-term expectation in Keynes’ terminology is concerned with all economic affairs that will occur in the future, including financial markets, and, in fact, too much deliberate easy money policy may have a more depressing effect.
Entrepreneurs usually raise money in the financial market for investments, for example to install equipment or to construct buildings. There are always lenders and borrowers in the financial market, and these professionals and the public sometimes distort the “genuine expectations” of the professional entrepreneurs who really conduct the firms. In this way, the marginal efficiency of capital, which should be performed by entrepreneurs who undertake investments, has sometimes been influenced largely by short-term expectations and speculative motives. In chapter 12, titled “The State of Long-term Expectation” in The General Theory, Keynes wrote:

But the daily revaluations of the Stock Exchange, . . . inevitably exert a decisive influence on the rate of current investment. . . . Thus, certain classes of investment are governed by the average expectation of those who deal on the Stock Exchange as revealed in the price of shares, rather than by the genuine expectations of the professional entrepreneur. (Keynes 1936, 151)

Then:

Speculators may do no harm as bubbles on a steady stream of enterprise. But the position is serious when enterprise becomes the bubble on a whirlpool of speculation. When the capital development of a country becomes a by-product of the activities of a casino, the job is likely to be ill-done.

(Keynes 1936, 159)

In his lectures, Hishiyama has sometimes explained this thought of Keynes on the relation between the rate of investment and the state of the stock market as follows: “I will give the example of the ‘kurogo’ of Kabuki, one of the Japanese traditional performances. He wears a black suit so as not to be seen from the audience and plays a supporting role to set props on the stage. He is really an indispensable person to Kabuki, but only as a shadow. The banking system and the financial market could be considered to play the role of the ‘kurogo,’ sup-

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14 We can see it in the recent experience of Japan. Until the introduction of drastic easy money policy by the new governor Kuroda along with the so-called Abenomics by the Prime Minister Abe, Japan has suffered serious economic slumps for more than ten years even under the monetary ease. It is quite obvious that Abenomics, which is the main economic policy of the Japanese cabinet of today, is affecting the state of confidence of the public (including entrepreneurs and professionals in the financial market) in Japan when they create their expectations for the future. The main tactics of easy money policy and its effect will rest on how rapidly the central bank can lower the rate of interest falsifying the expectations of the public.
porting real activities of the economy. If they come to the front, and come to govern the economy, then the state of confidence of entrepreneurs for the future might be shaky.”

IX  Concluding Remarks: Hishiyama’s Judgment on the Circular Flow Analysis

Hishiyama always appreciated the meaning of the analysis of the circular flow, rather than the analysis of the equilibrium of demand and supply.

Here, we reexamine the circular flow analysis and the reproduction system in Quesnay’s Tableau. The main point here is that Quesnay did not necessarily outline how prices were created, and only contended the need for bon prix for the French economy during his time. Therefore, as Vaggi (1987) suggested, we believe it is important to examine whether net revenue (i.e., produit net) includes farmers’ profits. Then, we can extract the price formation that must be hidden within the Tableau. Before proceeding to the price system, we introduce Hishiyama’s early contribution on the quantity system (= the system of amounts) under constant prices. In the original Tableau (the zig-zag), landlords lead the public by showing their consumption patterns. “If we represent the dépenses du revenu (= expenditures from the landlords’ income) by a, and the ratio of the expenditures on agricultural food-stuffs to the whole expenditures of each component sector by r in the Tableau Fondamental, the process of all transactions postulated explicitly and implicitly in the Tableau can be expressed in a general equation as shown in (2)” (Hishiyama 1960, 2–5. We have made a few modification):

\[ x = yr + ar, \quad y = x(1 - r) + a(1 - r), \quad 0 < r < 1. \]  \( (2) \)

So that,

\[ x = \frac{a(2r - r^2)}{1 - r(1 - r)}, \quad y = \frac{a(1 - r^2)}{1 - r(1 - r)} \]  \( (3) \)

The symbol \( x \) denotes the sales of the industry I (agricultural products), and \( y \) is the sales of the industry II (manufacturing products). The neutral case is shown by \( r = 0.5 \), and we get that \( x = y = a \). According to Quesnay, the total sales \( x \) is equal to the net product in the amount, and the net product will be the revenue of landlords as rent. Therefore, if we presume \( a_0 \) to be the initial revenue of landlords and exogenously fixed, then, the revenue of the next year, \( a_1 \), which is equal to the total sales of the industry I of this year, \( x_1 \), will increase with the ratio \( r \). The point to be paid attention to, is that total sales \( x \) and \( y \) do not include the inner transactions within the industry itself, and the ratio \( r \) is not the ratio which is technically indispensable for the economic system, but the flexible ratio socio-behaviorally determined by the imitation.
In this way, Hishiyama succeeded to prove the dynamical characteristic which was hidden in the original Tableau by use of the geometric approach, and his contribution (1960) has been mentioned by many eminent authors thereafter (see Eagly 1969, Eltis 1975, Vaggi 1987, etc.).

The following expresses the general price system that is supposed to exist in the Formule of the Tableau.

Here, $p_1$ and $p_2$ represent unit prices of agricultural products and manufactured products, respectively. The technical coefficients are shown by $a_{ij}$ where the amount $l_{i,j}$ of product $i$ is needed to produce one unit of product $j$ $(i$ and $j = 1$ or $2)$. Then, $T$ expresses the rent, and $r$ is the uniform rate of profit through competition:

$$
p_1 = (p_1 a_{11} + p_2 a_{21}) (1 + r) + T,
$$

$$
p_2 = (p_1 a_{12}) (1 + r).
$$

According to Quesnay, the technical coefficients $a_{ij}$ are presumably considered as technically constant, and the price of agricultural products, $p_1$, is given in the trade market at the level of bon prix. This price is given exogenously, so that the rent, $T$, and the rate of profit, $r$, could be solved at the following level:

$$
p_1 = \frac{T}{1 - (a_{11} + a_{21} (1 + r)) (1 + r)},
$$

Then, based on our understanding of Quesnay’s rent theory:

$$
p_1 = \frac{T}{1 - (a_{11} + a_{12} a_{21})}.
$$

A numerical example: $a_{11} = 0.4$, $a_{21} = 0.2$, $a_{12} = 1$, $r = 0$.

Therefore, the rent $T$ is earned, $0.4p_i$.

At least in the "Formule du Tableau Économique," which could be considered the complete version of the Tableau, the capital used up in the production process was treated as a cost and not supposed to generate any profits. Therefore, for Quesnay, who thought that manufacturing sectors do not generate any net product and should be called “stérile,” the rate of profit, $r$ should be zero. If so, as the price of agricultural products, $p_i$, is rising in the market, the amount of rent, $T$, will also grow (see formula (6)). For the revival and the development of agriculture in France, and especially for the benefit of landlords, a sufficiently high price of agricultural products (i.e., the bon prix) was required.

The more general case is shown in formula of (5), summarizing Vaggi’s idea. If, according to Vaggi (Vaggi 1987, chapter 5 and the table 5), we appropriate the rent, $T$, for the cost and presume it to be constant, then, the profit rate, $r$, will become an increasing function of the agricultural product price, $p_i$.

In contrast, if we assume the rent $T$ is zero, then $r$ shows the rate of surplus

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15 The real value of rent measured by $p_i$, i.e., $(T/p_i)$ will be unchanged.
of the economy, and coincides with Sraffa’s maximum rate of profits, $R$ (Sraffa 
1960, 21–22). Furthermore, as shown in formula (5), in general, the rent and 
the rate of profit reveal the conflicting relation.

It might also be helpful to indicate that Sraffa himself thought of the 
rent-earning natural resources being similar to non-basic products (Sraffa 
1960, 74–75).

Ricardo, who tried to render Quesnay’s idea of rent obsolete, finally invented a new solution for the theory, called the theory of differential rent. Pasinetti shows a clear-cut model of Ricardian rent theory:

$$X = f(N),$$

(7)

with the properties: $f(0) \geq 0$, $f(1) > w^*$, $f^\prime > 0$, $f^- < 0$. (8)

Here, $X$ denotes the quantity of agricultural products produced in a year, $N$ the number of workers employed, $w^*$ the wage rate that is fixed at the subsistence level, and $f$ represents the production function. In the Ricardian system, the productivity of agriculture is diminishing as the cultivation proceeds to marginal land ($f^- < 0$) (Pasinetti 1977, 8–12).

Ricardo thought that the least fertile soil, i.e., the marginal land cannot generate any rent, and the value of products even from such land should be formed by profits and wages:

$$N^* f'(N^*) = w^* N^* + P^*.$$ 

(9)

Here, $N^*$ and $P^*$ represent the number of workers employed and the overall profits that the entrepreneurs receive, respectively, when the cultivation proceeds to the marginal land. Therefore, the overall real rent is:

$$T = f(N^*) - N^* f'(N^*)$$

(10)

Then, how do we settle the value, or the price of agricultural products? Pasinetti introduced a two-sector model, which consists of the agricultural sector and the gold producing sector. The gold sector takes constant returns to scale. With the production function of the gold sector, $X_2 = g N_2$, where $X_2$ indicates the amount of gold produced in sector 2, $N_2$ is the number of workers employed in sector 2, and $g$ is constant. Suppose that the output per-capita of gold is taken as the numéraire, and that the productivity per capita must be equalized by competition between sectors. Then, we get the following:

$$gp_2 = 1 \quad \text{(the nonmeraire)},$$

(11)

$$\frac{p_i X_2}{N_2} = \frac{p_i (X_1 - T)}{N_1} = 1 \quad \text{(the equalization of productivity)}.$$ 

(12)

Here, $X_1$ represents the quantity of agricultural products and $N_1$ the number of workers employed in sector 1. Therefore, at the marginal land, we get the price of agricultural products, $p_1$, as follows:

$$p_1 = \frac{1}{f^\prime(N_1^*)}.$$ 

(13)
According to Ricardian theory, price $p_1$ of the marginal land consists of the subsistence wages and profits, but does not contain any rent. In addition, since the productivity of labor $f'(N,*)$ has an inverse relationship with the price of agricultural products, $p_1$, overall capitalists including manufacturing sectors will benefit more as $p_1$ decreases. Now there arises a serious problem. That is, provided the value of a unit of agricultural products at the marginal land is determined solely by the amount of labor that is flexible, and the real wage rate is fixed at the subsistence level, what kind of economic factors will influence the price level of agricultural products? Will it be the demand for those products? Or, will the rate of profits needed for capitalists of the whole economy determine its level?

The following quote describes how Hishiyama interpreted Sraffa’s uniform rate of profit, which appears in the *Production of Commodities*. He wrote:

> While “the competition” of capital (based on the profit maximization motive of the capitalist) would be considered to be the factor which will allow the actual market rates of profits to settle down at the level of the original (uniform) rate of profits (where the actual rates are differentiated from the original level by some temporary and accidental cause), it should never be the factor which will determine the uniform rate of profits itself.

(Hishiyama 1994, 106)

According to Hishiyama, the market price does not appear within the context of the *Production of Commodities*, and the self-adjusting process of market prices and the process of gravitation to the uniform rate of profits are not assumed in Sraffa’s system of production. “However, Sraffa has suggested a Ricardian model of the process of gravitation” (Hishiyama 1994, 106–07) during the controversy with Hayek in 1932. As a result, Hishiyama concludes that, even for colleagues who study economics of “circular flow,” the question of whether the gravitation to the natural system should be regarded as more essential than the structural viability condition of the economy is still open.

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**References** (*written in Japanese*)


—. 1994b. Reappraising Quesnay’s Tableau Économique, the draft presented at the international workshop held at Bertinoro, Italy, September 25, 1994.


