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Kyoto School of Modern Economic Theory*

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In this article, the contributions of three economists, Takata Yasuma, Shibata Kei, and Aoyama Hideo who taught at the Kyoto University are discussed from the point of view of the development of the general equilibrium theory. Takata, being also a sociologist, tried to supplement the general equilibrium theory by his own social power theory. Shibata, well-known by the so-called Shibata-Okishio Theorem, was a pioneer of the so-called analytical Marxism and solved problems of Marxian economics by the general equilibrium theory. Finally, Aoyama made a pioneering attempt to dynamize the general equilibrium theory. On the basis of contributions made by these Kyoto economists, the remarkable development of the general equilibrium theory was made possible in Japan after 1945.

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Kyoto School—The Branch of Modern Economic Theory

When a young Japanese historian of economics attended an academic meeting held in the U.S, an American scholar sitting next to him inquired regarding his research topic. He answered proudly that he studies topics related to Adam Smith. The American scholar remarked, “Smith was not Japanese. Leave Smith to us. It is better that Japanese researchers study Japanese economists”.

However, this is a serious mistake. Smith was neither Japanese nor American. He was not even an Englishman. In fact, he was Scottish. If only scholars of the

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same nation are permitted to study Smith, the tradition of Smith research will die. However, it is definitely a problem if Japanese scholars exclusively study economists of foreign countries. I shall not speak about Smith's Japanese contemporaries. However, if we consider 20th century economics and discuss Schumpeter, Japanese economists may be permitted to appear in the history of economics.

The "Kyoto School" of philosophy is well known; however, economics also has its own "Kyoto School". Kawakami Hajime who taught at the Kyoto University in the early years of the 20th century was in a sense the first great economist in Japan. He studied Marxian economics and left the university to participate in the then illegal communist movement. After 1945, Kyoto University became the stronghold of Marxian economics. However, this paper addresses another stream of the Kyoto School of economics and not Marxian economics.

The contribution of the three economists, Takata Yasuma, Shibata Kei, and Aoyama Hideo who taught at the Kyoto University before and after 1945 was at par with their Western contemporaries. The theory of general equilibrium connected the three economists. In other words, they applied simultaneous equations that equalize demand and supply in the multitude of markets in order to investigate economic problems. The school also has the distinction of transplanting the general equilibrium analysis, the basic theory of the present-day economics, to Japan and developing it independently.

"Marshall in Japan"— Takata Yasuma

Takata Yasuma was born in the Saga Prefecture in 1883, the year Marx died and Keynes as well as Schumpeter were born. He enrolled into the Kyoto Imperial University after studying at the Fifth National High School (Kumamoto). Although his major was sociology, he also studied economics. His research on Marxian economics dates back to earlier than that of Kawakami. After the publication of *Shakaigaku Genri* (*The Principles of Sociology*) in 1919, he was appointed as the Professor of Economics at the Kyushu Imperial University in 1925. Subsequently he moved to Kyoto Imperial University in 1930 and lectured on the principles of economics. His voluminous work *Keizaigaku Shinko* (*New Economics Lecture*) comprising five volumes was published during the period 1929–1932. He retired from the Kyoto Imperial University in 1944. In 1951, he was appointed Professor at the Osaka University and established the Osaka University Institute of Social and Economic Research in 1954.

He was designated a Person of Cultural Merit (Bunka Korosha) in 1965 for his contribution to the development of sociology in Japan. Takata published more than 100 books and 500 papers; however, *Keizaigaku Shinko* is probably his most successful book in economics, which is comparable to Marshall's *Principles of Economics* in the English-speaking world. As a result, Martin Bronfenbrenner, an American economist with in depth knowledge of Japan, gave Takata the nickname "Marshall in Japan". Takata died in 1971 at the age of 88 years.

Standing on the General Equilibrium Theory

In the introduction of *Kakaku no Riron* (*The Price Theory*), which is the second volume of *Keizaigaku Shinko*, Takata declared his stand on the general equilibrium theory. In this volume, the general equilibrium theory of the Walras-Cassel type was presented in the main text and the Paretian theory of ordinal utility and variable production function was developed in the appendix. However, regrettably, confusion regarding the interpretation of the simultaneous decision model led Takata to conclude that the prices of the production factors cannot be determined without considering the effect of exogenous social powers. However, this conclusion was withdrawn in volume 4 of the book, *Bunpai no Riron* (*The Theory of Distribution*).

In this volume, it was argued that the general equilibrium containing the equilibrium of supply and demand in the factor market is attainable without the effect of social powers. However, it was also pointed out that the factor given exogenously prior to the adjustment process could influence the state of equilibrium finally achieved. Moreover, it was emphasized that existence of unemployment could not be explained without considering the influence of social power on the supply of labor.

In the introduction of *Kakaku no Riron*, Takata wrote, "standing on the general equilibrium is not my originality of this book. Dare to mention the original characteristic, I would mention the power theory of the price". Although he agreed that the general equilibrium theory can determine factor prices by itself, he insisted that it is only a first approximation to the reality and that a second approximation considering the social powers was required.

In volume 5, *Hendo no Riron* (*The Theory of the Fluctuation*), the significance of the influence of the increase in population on the economic fluctuation was emphasized. The demand fluctuation due to the population increase results in an accelerating, excessive, and inert change in the producer goods industry. Subsequently, the cause for the continuity of business fluctuation is attributed to an excessive correction in the wage that is influenced by the effect of social powers. The voluminous work *Keizaigaku Shinko* lays an emphasis on population as the ultimate variable in its conclusion. This is because population is the source of social powers.

Takata's Power Theory

Takata's view of the general equilibrium theory repeatedly underwent changes, even after *Keizaigaku Shinko*. The final view was presented in *Seiryokusetsu Ronshu* (*Essays for Power Theory*) (1941). The traditional general equilibrium theory, referred to as the theory of utility economy by Takata, is logically consistent and can determine the prices of productive factors, including wage and positive interest rate. However, while dealing with real problems particularly that of unemployment, it is essential to introduce power theory. This is because the theory of utility economy cannot explain the phenomenon of unemployment.

The utility of workers includes the utility that satisfies the want of power in a

specific way. Workers will not supply labor as long as the disutility arising due to loss of pride because of sub-standard wages is not eliminated. It is after the point of normal wage rate that the decision-making over the quantity of labor supply commences. In other words, both, the utility from consumption that is available by virtue of the wage and that from pride, must be considered. In Keynesian terms, the unemployment that occurs from the non-supply of labor below the proper wage rate may be regarded as voluntary unemployment.

Takata approved the existence of the Keynesian type of involuntary unemployment. However, he criticized Keynes for explaining that the workers only resist the reduction of monetary wages and not of real wages. According to Takata, neither the theory of utility economy nor any other economic theory can explain this unless his power theory is utilized. Takata explains that unemployed workers would not compete with each other to reduce wage rate in order to salvage their pride.

Covering Extensive Topics—Shibata Kei

Shibata Kei was born in Fukuoka in 1902. He enrolled into the Kyoto Imperial University from Yamaguchi High Commerce School and studied Marxian economics under Kawakami Hajime. He became a lecturer at the Kyoto Imperial University in 1929 and was promoted to post of an associate Professor in 1931. Shibata learnt the general equilibrium theory from Takata. After publishing two volumes of *Riron Keizaigaku* (*The Theoretical Economics*) during the period 1935–1936, he visited Harvard University where Schumpeter was a teacher. It was the year that Keynes's *General Theory* was published. He became a full-time professor at the Kyoto Imperial University in 1939. During the war years, he made unsuccessful attempts both in politics and in the theoretical investigation for establishing the totalitarian economics theory. He resigned in 1946.

He returned to the academic world in 1952 and lectured on economics at the Yamaguchi University and later at the Aoyama Gakuin University until 1976. In 1986, Shibata died at the age of 83 years, leaving behind 22 books and 122 papers that covered a wide range of topics from theoretical and empirical problems in economics, criticism of present-day economics from the resource and environment point of view, to an idealistic philosophy on the history of the human race.

Pioneer of Mathematical Marxian Economics

Riron Keizaigaku is a voluminous work of more than 1000 pages in two volumes. In the beginning of the introduction, Shibata's position is clearly described: "The equation system of the general equilibrium of the Lausanne school will become an effective means to the research on the economic theory when it is simplified in an appropriate way". In other words, he applied a simplified Walrasian system to investigate problems presented by Marx in his *Das Kapital*, beginning with goods, money and capital, production (the decision regarding the income of the capitalist, laborer, and landowner), business fluctuation, circulation

(the circulation of goods and money), and so on. After 1945, studying the problems of Marxian economics by applying mathematical tools of modern economic analysis was common. Shibata's theoretical investigation in the 1930s is the pioneering work in this direction.

However, Shibata's contribution in his *Riron Keizaigaku* was not confined to the field of economic theory. His empirical analysis of the long-range fluctuation in world economy was highly appreciated by Shinohara Miyohei who referred to it as "the first Kuznetsian analysis in Japan". Shinohara also appreciated Shibata's analysis of the economic fluctuation in the 1930s addressing it as "a remarkable Friedmanian analysis" with respect to Shibata's effective prediction of the emergence and disappearance of the great depression of the 1930s in monetary terms. The fact that Shibata was both a sharp theoretician and an excellent empirical analyst should be remembered.

Shibata-Okishio Theorem

The criticism of Marx's theory of decline in average profit rate is probably his most notable contribution to economic theory.

"A change in the production method, which causes a decline in the price of the product compared with that of the product of subdivision where this change is not introduced, always increases the average profit rate even if it improves the price level rate of capital composition. Capitalists adopt the production method that accompanies the improvement of price level rate of capital composition as they intend to reduce the production cost. Therefore, the diffusion of such a production method causes an inevitable decline in the price of the relevant product. Thus, the improvement in the price level composition of capital in itself does not cause a decline in the average profit rate; rather, it brings about the rise in the average profit rate".

The simultaneous equations comprising prices, unit production costs, and the profit rates of various products were analyzed. As a result, it was proved that introducing new technology to reduce the unit production cost always increases the profit rate independent of its effect over the organic composition of capital (the ratio of the circulating capital such as the wage payment and the fixed capital such as machinery). This was later generalized by Okishio Nobuo from the Kobe University and is now internationally recognized as the Shibata-Okishio Theorem.

However, although Marx's law of the declining profit rate appears to have been refuted by this theorem, the problem is not completely solved. This is because there is a considerable gap between the dynamic model of the capitalist economy, which Marx described vividly in his *Capital* and the theoretical model based on which this theorem was proved. The economy of scale, that is, the decline in the production cost accompanying the growth in scale, was emphasized by Marx. The Shibata-Okishio Theorem supposes a constant unit production cost, thus neglecting the economy of scale. A firm that introduces new technology that increases the fixed capital compared with the circulating capital, which is proportional to the

production scale, is forced either to expand production in order to attain a reduction in the unit production cost on the grounds of the economy of scale or to reduce the price in order to sell increased products. As a result, although the profits of that firm may increase, the profits of the firms conforming to old technology decrease. In case all firms adopt new technology, the output increases and the price decreases. As a result, the possibility of a decline of all firms and thus, a decline in the profit rate arises.

Criticism against the Austrian School

Shibata criticized not only Marx but also Böhm-Bawerk, a prominent anti-Marxist belonging to the Austrian school. Böhm-Bawerk denied the effect of the influence of social powers over the market by citing his capital theory. The question is the effect of the wage hike due to the exogenous interference in the labor market, such as union activity, on the total amount of wages. He concluded that the exogenous wage rate hike diminishes the total sum of wages based on well-known numerical tables regarding capital interest rate (the profit rate), wage rate, and the period of production. This is because a rise in wage extends the period of production, thereby decreasing the gross wage per period.

Shibata criticized the fact that this result was based on the peculiar supposition of the Austrian capital theory. In other words, it presupposes the mono-linear structure of production that is composed of original input of labor and the emergence of final product after the production period. Then, how is in the more general case of multi-linear structure of production, in which the input is composed of labor and product, i. e., a neo-classical model? Shibata tried to refute Böhm-Bawerk by his own numerical examples.

Regrettably, in both the cases, Böhm-Bawerk and Shibata, the analysis is performed on the assumption that the fixed gross amount of capital is given exogenously. However, the gross capital that is held in the form of savings is originally an endogenous variable within the theoretical model and should be treated as an unknown quantity. If we analyze the theoretical model that incorporated the saving behavior, we identify that the gross amount of wages is determined by an increasing function of the wage rate that is given exogenously. We can conclude that Shibata's disagreement with the conclusion of Böhm-Bawerk was justified.

Economics and Sociology—Aoyama Hideo

Aoyama Hideo was born in the Okayama Prefecture in 1910. He enrolled into the Kyoto Imperial University from the Sixth National High School and received the guidance of Takata Yasuma in the graduate school. He became a lecturer at the Kyoto Imperial University in 1936, was promoted to the post of associate professor in 1940, and became a full professor in 1946. After 1945, several economists who raised economics in Japan to the international standards, such as Morishima Michio, were influenced by his seminar in Kyoto University. He served as the

director of the Institute of Economic Research in Kyoto University from 1966 to 1971. After retiring from the Kyoto University in 1973, he taught sociology and economics at the Kwansei Gakuin University and other private universities. He was nominated as the member of the Japan Academy in 1984 and died in 1992 at the age of 81 years.

Aoyama published over 10 books and more than 200 papers in his lifetime. In economics, he began his research with the theory of monopoly and imperfect competition. Subsequently, he critically studied the theory of economic fluctuation at the Cambridge school centered on Robertson, the theory of the Scandinavian school, the business cycle theory of Spiethoff, and so on. Further, he proceeded to criticize Say's law from the viewpoint of the dynamic general equilibrium theory. In addition, he made sociological contributions such as the research into Max Weber's social theory. The principal achievements are now compiled in the *Aoyama Hideo Chosakushu* (*Works of Aoyama Hideo*) (6 volumes and 1 supplement volume, Tokyo: Sobunsha, 1999).

The Research on Edgeworth's *Mathematical Psychics*

Aoyama's *Dokusen no Keizairiron* (*The Economic Theory of the Monopoly*) (1937) stands out when compared with similar contemporary works in Japan and overseas. It was based on the thorough research of Edgeworth's *Mathematical Psychics* (1881). In this book, Edgeworth commences with isolated exchange, that is, bilateral monopoly in exchange, and attains perfect competition as the extreme of the infinite increase in the number of participants. Therefore, this book became one of two major origins of the modern general equilibrium theory besides Walras' *Élements d'économie politique pure*. While the Walrasian theory has developed continuously with Hicks' *Value and Capital* (1939) and Debreu's *Theory of Value* (1959), the general recognition of the significance of Edgeworth's limit theorem in context of the modern general equilibrium theory had to wait until 1960s.

Therefore, it is remarkable that Aoyama dealt with perfect competition by way of a "modern reproduction" of Edgeworth's idea that "aims to solve the problem by going around the contract curves without supposing the law of one price" as was done by Walras. This work was carried out when Edgeworth's book was known only by name and rarely examined in detail. The proof of the theorem given by Edgeworth himself is considerably intuitive and full of omission that made this book notoriously difficult. In contrast, Aoyama reproduced Edgeworth by a thorough investigation of every conceivable possibility, which predetermines his later research style.

Incidentally, the Japanese translation of Edgeworth's *Mathematical Psychics* is yet unavailable, which appears unusual since several other economics classics have plural Japanese translations. This is probably due to the extreme difficulty level of this book. A number of quotations from Greek and Latin classics are amalgamated in this book together with the development of higher mathematics. Truly, readers of the book feel as if they are forced to differentiate and integrate the poetry of Homer.

Toward the Dynamics of the General Equilibrium Theory

After 1944, Aoyama compiled his papers on the economic fluctuation theory from 1934 to 1944 into three books: *Keizai Hendo Riron no Kenkyu—dai 1 kan, Kisoteki Shomondai* (*The Study of the Economic Fluctuation Theory—Volume 1, Basic Problems*) (1944), *Keizai Hendo Riron no Kenkyu—dai 2 kan* (*The Study of the Economic Fluctuation Theory—–Volume 2*) (1950), and *Cambridge Gakuha oyobi Hokuo Gakuha no Keizai Hendo Riron* (*The Economic Fluctuation Theory of the Cambridge School and the North European School*) (1953). In these papers, he rigorously formulated two major research directions of the economic fluctuation theory, the temporary (momentary) equilibrium approach and the period analysis approach. He examined their characteristics, significance, and limitation. This was an achievement of international standards in those days. Further, it contains valuable suggestions on the history of the dynamic economic theory as well as for the progress of the business fluctuation theory.

The most important paper among them is *Seigakuteki Ippan Kinkou Riron to Dougakuka no Shomondai* (*The Static General Equilibrium Theory and Problems in Making it dynamic*) (1938). In order to make the general equilibrium theory dynamic Aoyama suggested the idea of so-called temporary equilibrium before Hicks' *Value and Capital* (1939).

First, when considering the general equilibrium model, which ensures equilibrium in multiple goods market through demand and supply functions that are dependent on prices, the time dimension is ignored for the sake of simplification. However, when we consider the existence of capital goods that are produced, demanded, and used for the production of the other goods, the focus of analysis shifts from a static economy to an economy over time. When we apply general equilibrium theory to such an economy, in other words, make general equilibrium theory dynamic, a possible consistent solution is the static economy that does not change over time. In addition, exogenous factors, such as population, land, preference of consumers, manufacturing technology, and so on do not change, and the quantity of existing capital goods, which is an endogenous variable, too, remains constant over time. In other words, the output of new capital goods must equal the capital depreciation.

However, Walras himself suggested the consideration of growing economy. Otherwise, the gap between theory and reality is vast. Therefore, Aoyama suggested an economy that changes over time while equilibrating in each period. Because the planning period of economic agents extends into the future, the supply and demand in this period are a function of both the present prices and the expected future prices. However, since the expected prices are functions of prices in the past as well as the prices in the current period, the supply and demand in this period are functions of only the price in the current period. The general (momentary) equilibrium price system for this period that equalizes the supply and demand assumes the quantity of existing capital goods produced in the preceding periods and disposable in this period as given data. However, the quantity of existing capital

goods changes in the next period by as much as the difference between the quantity of new capital goods that are produced in this period and the quantity of depreciated capital goods. Therefore, the general equilibrium price system in the next period differs from that in this period, although the other conditions do not change.

The concept that applies the general equilibrium theory to the dynamic economy by way of a series of momentary equilibrium that change over time is the same as Hicks's concept of temporary equilibrium in his *Value and Capital*, which was actually published a year later. In his efforts of making the general equilibrium theory dynamic, Aoyama progressed to the point of being able to anticipate Hicks.

Japanese Contribution to the General Equilibrium Theory

The contribution of Japan to the development of the economic theory after 1945 was most conspicuous in the field of general equilibrium theory. This can be clarified by considering, for example, Arrow-Hahn's *General Competitive Analysis* (1971), a representative work on the general equilibrium theory of that period. From among the 171 literatures that are listed in the reference section of this book, those contributed by Japanese amount to 18. This ratio is considerably high; since it is said that generally the share of Japanese in international economics research is approximately 2%. For example, from among 1000 economists included in Mark Blaug (ed.) *Who's Who in Economics* (1999), Japanese economists amount to only 20.

The remarkable contribution of the Japanese to the general equilibrium theory after 1945 became possible as a result of the base that was built by outstanding researches before 1945. It can be remarked that one of the important pillars of this base was constructed in Kyoto; because the link that connects the three economists of the Kyoto school was indeed the theory of general equilibrium.

However, at the same time, none of the three economists confined themselves to the research of the general equilibrium theory. Takata Yasuma, who was also a sociologist, considered the general equilibrium theory as the first approximation to the economic reality and developed the power theory as the second approximation in order to establish sociological economics. Shibata Kei deeply regretted that his book, the voluminous *Riron Keizaigaku* could not attain the goal of his research, "the research of the law that regulates the historical change of the social structure of production". He began his endless journey of economics during and after the war. Finally, Aoyama Hideo retained "his original interest in the understanding of the modern society, particularly its capitalistic structure" (by Kasuga Masashi) and expressed an interest in the sociological study by studying the sociology of Max Weber and Talcott Parsons.

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