An Economic Cycle Explanation beyond the Cobweb Theorem

Tadashi (Gan) Watanabe

I

The cobweb phenomena, especially of farm product price and quantity cycles, were rather theoretically acknowledged more than statistically analyzed. This theory was meritorious to extend the Cournot-Marshallian conception of static equilibrium between variable demand and supply to dynamic osciliation cases. It has also some merite in correcting industrial practices which are led only by the spot prices while the quantity of supplies should be known. Yet there should be farther considerations of facts and analyses.

The recurring cyclical movements of farm products prices and quantities were descrived by several authors. The pig or hog cycle has been the most conspicuous one. The explanation was the regular lag of supplies to the demands, indicated only by the instantaneous prices. H. Schultz proposed previously the axiom of static principle of the equality of elasticities of demand and supply as the explanation of regular cycle phenomena.[1] Then be considered the cases of unequal elasticities between demand and supply, which cause cobweb phenomenon.[2]

It seems curious event that several authorities proposed this theory simultaneously in German, but it might be seen as a natural derivation or extention of demand and supply elasticity and equilibria conception in the probing German atmosphere.[3]

Dr. M. Ezekiel's "Cob Web Theorem" 1938 and Dr. G. Shepherd's Agricultural Price Analysis 1947 were the culminations of this throrem. Dr. A. B. Larson's view which appeared in the recent J. F. E. (46–2, 1964) is somewhat like to the recurring case of cob-web theory. Since the corn prices are rather stationary while the hog prices fluctuate heavily,

the hog price ratio would depend to the latter. Hog producers are, in Larson's view, working in the "feed back" or with "inertia" always lagging in the adjustment. Why don't some producers adjust without delay ? Probably the hog producers are satisfied by getting the stable incomes.

Dr. F. V. Waugh's latest article "Cobweb Models" in J. F. E. (46-4, 1964), which extended the single demand and supply to the related areas, made me to write this paper, for the present author has been reconsidering and taking other way, though he might claim to be the simultaneous finder of this theorem, for he reported in 1929 annual meeting of the Japanese Farm Economic Society, and published in 1932 papers to honor professor, Dr. K. Takaoka's 30 years jubilee in his seat. Late Dr. Sugimoto published the same theory using Hicksian difference equation in 1948. But they were in Japanese papers.

In the above report the author compared the prices of each harvest seasons to the amounts of transfer. The reciplocal relation between them and some responces of crop plantings and animal breedings, delaying in one or more years was found. The farm product prices would fluctuate heavily in the harvest seasons. But they would regain calmness and subordinate to the cycles.

II

Cobweb theoretikers would presuppose individual cycles. G. F. Warren demonstrated individual cycles such as hog, horse, wheat, apple and so forth, having different time spans.[4] He thought that the general economic cycle is the accumulation of individual cycles. Yet he introduced in his political economic system the money quantity increase which raise the general prices.[5] Supply of money can be most elastic and the cycle would result explosive inflation ! Explosions are not restorable, so the excentric divergent cobweb could not woven !

J. M. Keynes studied under A. Marshall and tried to combinate several elasticities. He seems as aimed to utilize the inflation gap of transferring money to some purchasers for rescue. His General Theory stands on

rigid statical basis, so had the weekness in concepting dynamic movements. His financial practices however were successful in preventing inflations, for he insisted sound money transferences.

J. A. Schumpeter was the strongest opponent to the individual cycle theoreticians, as he wrote: 1) "it would be a grave error to assume that the fluctuations actually observed simply indicates the effects of the presence of technological mal-adaptation, 2) it would be not the less erroneous to think that we have here the case of an indigeneous fluctuation, which of itself might go indefinitely, possibly even with increasing amplitude... It experiences the influence of cycles as far as it experiences cycle variations in consumers' expenditure...(It creates cycles if, as, and when its production involves innovation)...3) It is further neccessary to assume that they will take no account of their competitors actions until they all of them come out with their product. Obviously this assumption is unjustified, for the behavior of competitors is no secret. Therefore, waves started by a single disturvance would, not withstanding the lag, soon die down. The spider web problem is perfectly easy to understand on obvious common sence considerations, (but) their exact theory is beyond the scope."[6] Schumpeter extended his "general" cycle idea in his most complicated work "Business Cycles". He was at last deterministic, supposing compounds of 3.3 years "Kitchin", 11 years "Juglar", and very long, seemingly 25 to 100 years "Kondratief" cycles. All individual prices and productions are affected by these cycles only with different amplitudes, but the so called general cycle was explained off.

III

H. L. Moore was called by Schumpeter the "patron saint"[7], probably by his manysided theoretical and statistical works in the economics. His "Synthetic Economics" derived the production function, and "Generating Cycles" probed the cosmic cause of global economic cycles. It should be noted that he had never suggested policies.

Hasty policies are sometimes necessitated but their elongations are problematic. For example the Japanese rice policy began to appease the

1916 rice riot in the time of First World War days rice price soaring, by selling imported foreign rice. Then it became to the rice price normalizing until the Second World War days, in which government bought up rice and sold as the rationing. Since then the government has been unable to get rid of the monopolistic control with heavy loss of financing, though the rice price fluctuations have been extinguished.

Thus the control should be diminished, as the cycle events are rather natural and not controllable. The total rice harvests have not fluctuated heavily, while the local harvests have shown some cyclical phenomenon. The author worked as an agronomist to promote the rice growing in the extreme north east (Okhotsk sea side Kitami area of Hokkaido). It was a success in the years of prosperity decade after the First World War (1920–30). But in the succeeding years of depression decade (1931–41) several failures of rice growing were experienced. As an statistico-economist the author found some three year cycle movement of rice harvest, appearing in the combination of ten and thirty three years cycle of summer weathers changes.[8] It is very like the Schumpeter's business cycles components, and the Huntington's weather cycles.[9]

The pararell movements or coincidence of general business fluctuation, the rice harvest (summer weather), and drought in the west side of the Continent (not only in U. S. but also in Europe) would be the gloval phenomena caused by the fluctuation of solar activities. Some authors already suggested them,[10] and the present author has a new idea, which is writte in the following chapter.

In the U. S. the droughts of western states have been the important events. The New Deal policies taken to rescue the U. S. economy in depression of 1930s were on the one side to reduce the abundant supplies for price raising, which would have been achieved by the crop supply restrictions. Meanwhile came the drought years, which really shortened the supply but were rather ineffective to raise prices. U. S. Supreme Court's judgement, denouning the supply reduction contracts as unconstitutional, led the policies to the technical measures of soil conservation to replace cultivated fields in grasslands. The rain came after the contour

plowings and the gully preventions were done. "After a droughty 1936 opened with tremendous burst of rain. And shortly thereafter the revised tripple A had not only relaxed planting restrictions on most of the major crop, but inaugurated a policy of supplying lime and mineral fertilizers as grants in aid, to stimulate greater yields to the acre. God had his arm around us, surviving American farmers say of the good growing weather during the defense and war years... Plaise the LORD and pass the amunition".[11]   The war changed policies.[12]

Cycle problem would exclude the big war time waves, though some thought that the wars came in cyclically, for example T. Fukuda showed that the Japanese wars (Chino–Japanese in 1896–7 and Russo–Japanese 1905–6) came in 10 years periods, and Kondratief cycle relates to European wars.

IV

Here the intermediate cycles of farm prices should be analyzed.

In Japan before the First World War years when the rice price controll had not yet been done, it was said that a 3 year high and succeeding a 3 year low i. e. a 6 year price cycle was occuring. As the U. S. government has not controlled the prices of farm products, though some crop area controls were done, the author probed the wheat, corn and cotton prices of the U. S. found the six year cycle of overlapping three year cycles in pre–controll years.

H. L. Moore found the coincidences in the cyclical fluctuations of U. S. crop yields which would be affected by the rainfall and those of coal and iron, the latter being the signe of industrial prosperities. He proposed 8

[The author's new analytic device would be recommended. The prices are plotted on the semi–logarithmic scale. Hand drawn harmonic cycle shaws the secular one. Distances between the real prices and the synchronic points of the curve are the percentages of differences. These percentages are plotted on the level, and the intermediate harmonic cycle is drawn. Repeating the procedure one can draw the yeary seasonal fluctuations, which are eliminated the intermediated and secular movements.]

years cycle caused by the orbital cycle of Venus which affect the solar activities in influencing global phenomena. It might be necessary to know the cause of cyclical fluctuations of solar activity, which occur in clearly about a 11 year cycle, and rather unknown 40 month cycle. While the abundant and continuous sunspots are seen at the higher latitude on the sun, they appear intermittendly and scantily at the lower (near equator) sites. Probably the strong solar emittances which affect the global phe-nomena come straightly from the solar phase of sunspot, such as the corona which reach very far. Thus in the trough and elevating stages of sun-spots cycle, the global disturbances will occur, not only physically (magnet-ism in the sky and on the earth, climates and crop harvests), but also, though unconsiously, the social phenomena. *Economic catastrophes would come first, and then crop failures occur.* (As in 1929 U. S. economic crisis occured, and then in 1930s began the draughts. 1960 was the year of Japanese stock price panic, while crop damage came in 1964-5). The cause would be the same and only sensitivities are different! Care for the sun—spots ![13]

W. S. Jevons collected many studies of relaitonship between the sun-spots cycles and global phenomena in physical and social cycles, and concl-uded that the Indian droughts caused the English trade depressions.[14] The decline of Indian peasant's purchasing power caused the fall of English textile industry. The same time occurrence was the questiona-ble problem. The author propose the parallel occurrence of economic crisis and climate drawbacks. Cool summer of the eastside of continents come with the drought of the westside of them. In year the solar emis-sions are continuous or strong, the oceans elevate much vapor which precipitate water in the westside, and lands become warm in the east—side so the good harvests are gotten. On the other hand, in years the solar emissions are weak and intermittent, the ocean vapor is few, land temper-ature low, and harvests are poor. Moreover the unconcious activity of human society change in high and low parallelly. Small countries begin to fight in poor years and big countries fortifies in the rich years. These are the audacious conclusion of the present author. He found differences

of rainfall fluctuation in the U. S. in the pacific coast which is over 30 years cycle, while in the Atlantic coast area 3 years cycle are apparent.[15]

According to Moore, three phases of economy—economic certainties probabilities and dreams—have the criteria of truth. "Veritas vos liberabit" means logical truth to the rational economist; empirical truth to the practical economist; and intuitive wishful or revealed truth to the Utopian economist. To the synthetic economist it means empirically verified rational truth.[16]

He mentioned two economist, Leon Walras and Stanley Jevons. "Neither savant, at his entrance upon his scientific career, had lived the life of an economic anchorite, but each had earned his living in a practical occupation". But both were philosopher of scientific method, and were convinced that the appropriate instrument for working out economic theory is mathematics. Those analysis and synthesis might be true methods. But what are the availabilities of policies, which can turn the tides and open the new ways ? Were the black deaths in Europe, potato famine in Ireland, and destrictors by several wave, the causes of Occidental progress ? Were the eternal life cycles in quietude those of Oriental stagnations ?

V

The above essay was written in 1965. In two following years the author studied the occurrence of 10 and 33 year cycle (1930s, 1950s and 1960s) with analysis of sunspots distributions, by recorrecting the solar maps of Tokyo Astronomical Observatory. The sunspots were extremely few in 1954 and 1964 and the difference of their distribution in 1955 and 1965-66 in eminent. The former shaw even distribution on both sides of the solar equator, while the latter biased on the north side. The late professor of Tokyo University Dr. T. Terada noticed such biases in sun spots distributions on the areas of surface. The sunspots number were counted in the separated solar surphase as:

$$A + F : C + D$$
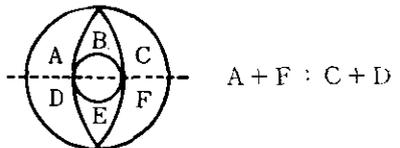
This comparison can be transformed as

$$A - C : D - F$$

The differences shaw the quickness of disappearance and the ratios shaw the biases of distribution. The former shaws the rarities of spots and the latter the direct effects on the southern phemisphere of the globe. As the solar emissions would come straightly from the centre of the sun to the surface of the glove, the terrestrial areas on these hits are warmed. As the glove surface would contract in cases of scarce sunspots and cold polar air, there would be cooler summer in east and dryer in west sides of the continents and probably the earthquakes.[17]

Economic theoretikers would like to reason the cycle phenomena immanently. Hicks introduced the difference equation for the analysis of economic disturvances. Allen edited Mathematical Economics taking start from cobweb theorem, which explains the disequilibria and progress to equilibria and value problems. Keynes' formula of multiplier seems to be a transformation of difference to ratio relation.

The reality of economic phenomena is combination of disturving and balancing or equilibriating movements. Natural and social disturvances and balances are occurring in realities. Cares should be taken both of exo–and endogenous waves.

VI

Then the author studied the price relations of potatoes. In Japan they are used mainly to make starches, while in the U. S. as a kind of vegetables, and the potato producing areas have had some concentrations. State Main, especially the County Aloostook has been the most famous center. State Idaho has been the next, produce for early supplies. The author had the chance to visit the State Main in July 1964, and called on the State University professors who made a donation of the materials of potato production statistics. The Idaho potatoes are said to be consumed rapidly in fresh conditions.

It is written that the potato producing farmers are rather losing, but none intend to diminish the growings. Though the price decline in rich
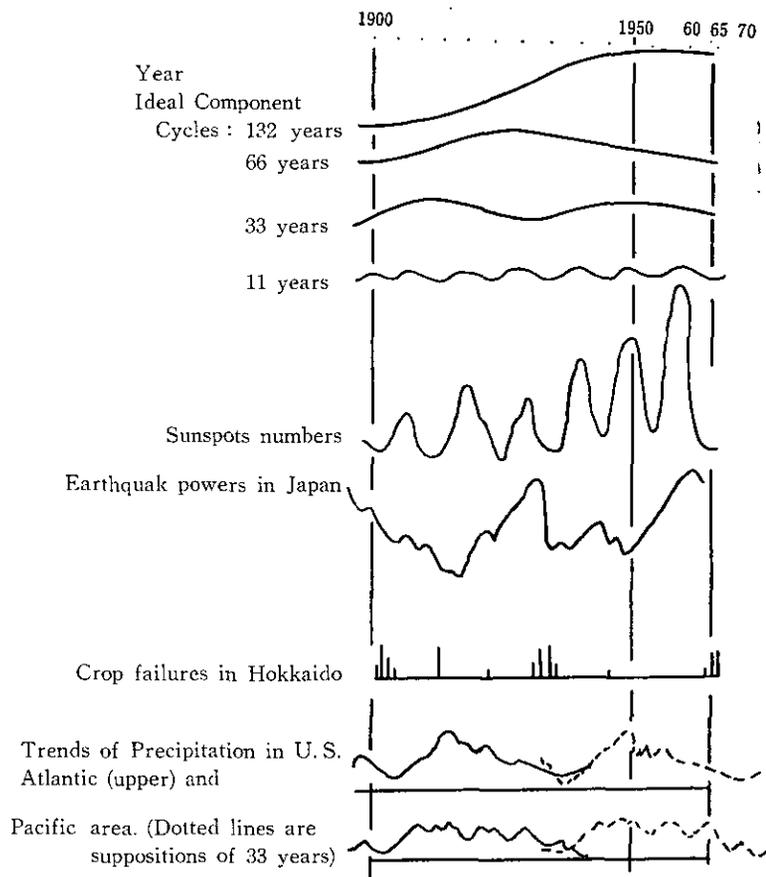
harvest years, the farmers earning are bigger then in poor harvest years in which the price rise occurs. As the monthly average prices move in the cycles of one, two or three years culminations, they could not be in the regular cycle. Seasonal (monthly average) prices show some shifting ceilings and bottoms. But in the long-run U. S. potato prices showed a twenty year secular cycle, which seems to be the overlaps of a 10 Year cycle. After deducting this secular cycle, a three year and sometime two year cycle can be seen. Those cyclical phenomena should be studied further.

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【附　図】

Pl. I.　Long Year Cycles of Solar
and Terrestrial Phenomena.

1900   1950 60 65 70

Year
Ideal Component
   Cycles : 132 years
      66 years

      33 years

      11 years

Sunspots numbers

Earthquak powers in Japan

Crop failures in Hokkaido

Trends of Precipitation in U.S.
Atlantic (upper) and

Pacific area. (Dotted lines are
   suppositions of 33 years)

Pl. II. Recorrected Solar Activity Distributions (of Quiet Sunyears1958-55 and 1863-66) Comparison.
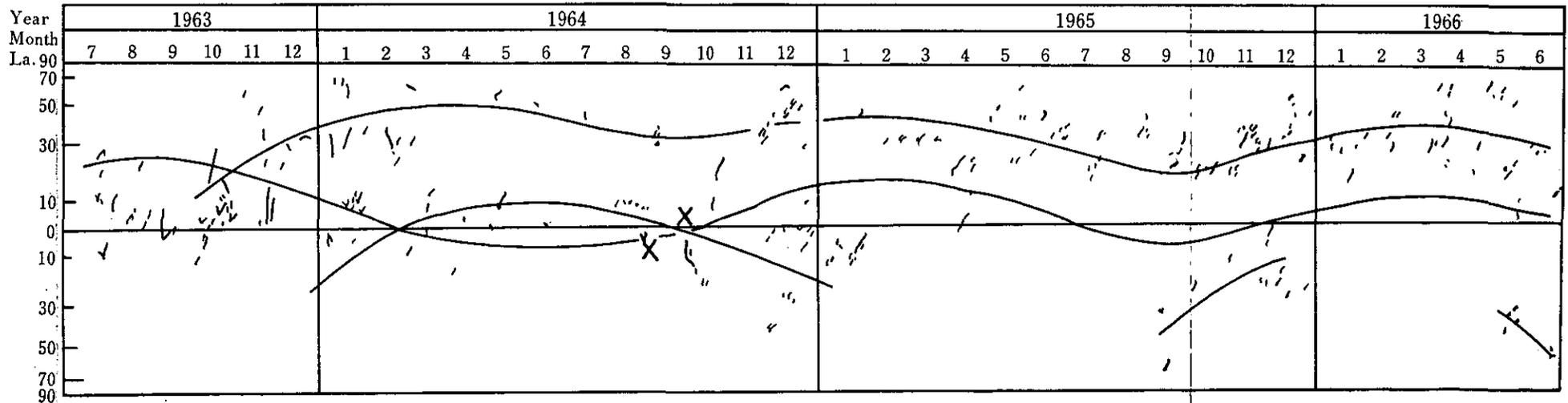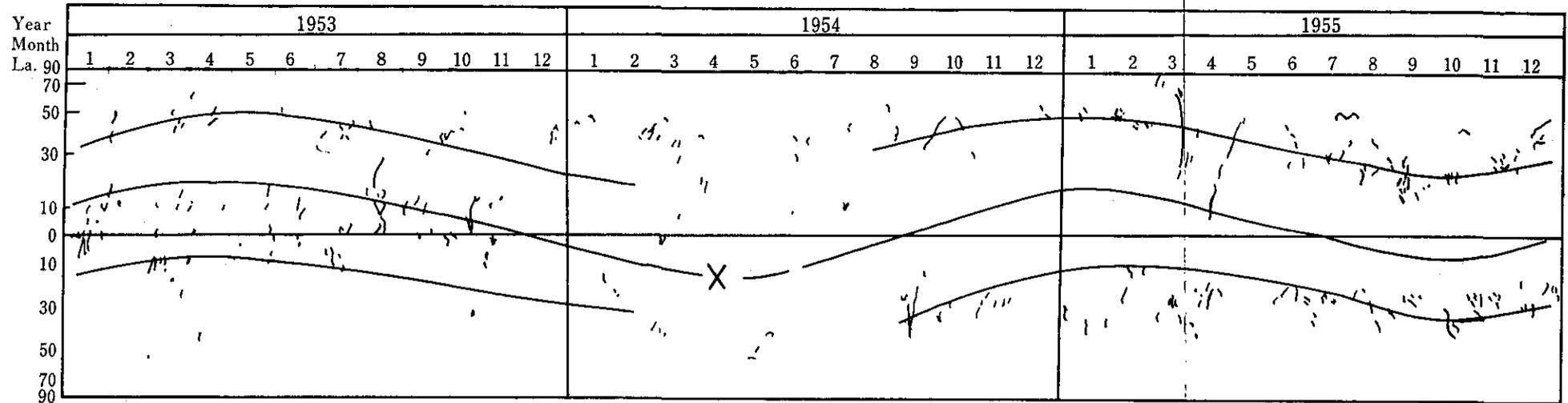
Solar activities (Filaments, faculae and spots) plotted on the latitudes as were seen. Harmonic curves are handdrawn as trendular. The biases are seemingly the sun's phenomena. Crosses shaw the extinctions of the sun's activity with which coincide the severely low temperature days in Hokkaido. (TADASHI WATANABE)

後　　記

　筆者は，北海道大学農学部卒業（1917）後10年間農事試験に従事し，特に北見地方で稲作を奨励した。その時は夏季高温続きで，稲作もよく，好景気でもあった。その後母校の助教授となったがその頃から不景気と凶作が続いた。経済学を研究し，特に A. マーシャルの経済弾性で均衡を説明することに疑を持って，いわゆる蜘蛛巣定理を発表したので1929であり，欧米学者と期を同じくした。しかし景気と作況の周期性を知り，これを太陽活動の周期性と結びつけて，その３年余，10年余及び33年の周期性を発表し1929～1934の不景気，北海道稲不作の時期から30年を望た最近1958～1961年の不景気及び不作を予想し大体適中を見た。最近太陽（フイラメント，ファキェレー及び黒点出現）の消長を東京天文台観測の図等によって見ているが，黒点の少いとき冷害があることは確かである。不景気も同時に起るかも思われる。

　なお，太陽活動の衰えるとき，地殻も冷却し，それが地震をひきおこすことも考えられる。経済学者は景気変動を経済内部の不均衡で説明したがる。その例が蜘蛛巣定理といえよう。ヒックスやアレンもそこから経済動学を出発させた。しかし経済外因というか，あるいはもっと深い内因を太陽活動の周期性に結びつけることが適当である。その周期中33年及11年のものは明かにあるが33年のものは明かでない。しかし太陽活動の緯度偏差がこの二つの間に見られるかと思われる。　　　　　　　　　　（渡辺侃　1967年８月）

supply of the United States in 1936.

They are concerned in part with the internal behavior of the quantity and velocity of circulation of the money supply itself with its trends, seasonal patterns, amplitudes of fluctuation and the like; and in part with the relations between the money supply and such things as prices, industrial production, national income, security transaction, etc.

The most significant conclusion in his analysis is that currency and deposits apparently move with or after, but not before, the several measures of general activity, and hence are a passive rather than an active factor at the start of the changes.

In this paper I emphasize the relativity of the rate of interest and the circular velocity.

An Economic Cycle Explanation beyond the Cobweb Theorem

Tadashi (Gan) WATANABE

Economists tend to explain economic cycles by disequilibium within an economy. The best known case is the cobweb theorem. However, the relationship of business cycles to non–economic factors such as the cyclical nature of solar activity is most important. The statistical evidences are presented.

The Study of Images of Jews in *Poems of a Jew* by Karl Shapiro

Yorifumi YAGUCHI

This paper treats images of Jews in *Poems of a Jew* by K. Shapiro. Through analysis of the main images there, the writer tries to identify Shapiro's views on Jews and the world in which they have lived.

The former half (1–4) is devoted to the study of images of Jewish consciousness. They are studies in connection with Freud's concept of Judaism. According to Freud, Moses was killed by Jews and there are two reactions to this murder on the part of Jews. One is the positive reaction and the other is the negative. Images of these two reactions are found in Shapiro's poems. His concept of Judaism is also pursued. His idea of Jews' relationship to God is explained.