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ECONOMIC CYCLES IN ANCIENT CHINA

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This paper is the second of a planned series examining the Chinese history of ancient economic thought in light of later Western thought. The first paper is Monetary Theory and Policy from a Chinese Historical Perspective which has been published in China Economic Review (Volume 26, September 2013, Pages 89-104.) This work is of importance in better understanding the Chinese policy response to the global issues of the day; the financial crisis, global warming and climate change. We acknowledge financial support from the Ontario Research Fund (ORF-F3), IDRC, and the Centre for International Governance Innovation (CIGI), Waterloo Ontario. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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ABSTRACT

We discuss business cycles in ancient China. Data on Ancient China business cycles are sparse and incomplete and so our discussion is qualitative rather than quantitative. Essentially, ancient debates focused on two types of cycles: long run political or dynastic cycles of many decades, and short run nature induced cycles. Discussion of the latter show strong parallels to Jevons' conception of sun spot cycles. The former has no clear contemporary analogue, were often deep in impact and of long duration. The discussion of both focused on agricultural economies. Ancient discussion on intervention focused on counter cyclical measures, including stockpiling, and predated Keynes and the discussion in the 1930s by centuries. Also, a strongly held belief emerged that cycles create their own cycles to follow, and that cycles are part of the inevitable economic order, a view consistent with Mitchell's view of the business cycle in the 1940s. Current debates on how best to respond to the ongoing global financial crisis draw in part on historical precedents, but these are largely limited to the last 150 years for OECD countries and with major focus on the 1990's. Here we also probe material on Ancient China to see what is relevant.

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1. Introduction

In 1862 the French economist Clement Juglar published “On the Business Crises and Their Occurrence Cycle in France, Britain and America”, Following this, Western economists conducted broad, systematic and in-depth analysis of economic cycles. In the wake of the 1929-1933 Great Depression, the work of Burns and Michell (1946) represented perhaps the high point of such investigations. But the Japanese property bubble of 1996, the Asian financial crisis of 1997 and the 2007 subprime mortgage crisis in Europe and the United States altogether have more recently drawn further attention to the phenomena. And in light of the ongoing post 2008 Financial Crisis, the focus is renewed on what can be learned from historical precedents for today’s global problems.

This paper takes a long term perspective and focuses on economic cycles in ancient China. Modern China has been steadily integrating into the global economy and has become an even more important part of the world economy since its reform and opening up. Academic research on China's economic cycles is now in full swing; but the theoretical basis, research tools and approaches are almost all based on the Western economic cycle analysis that is already in place and the research focus is solely on the phenomenon of economic cycles in China after China’s change to a market-oriented economy (1978).

In our long-term analysis, we categorize cycles into two types: long cycles of 200 to 300 years and short cycles of 12 years. We note that we are dealing with agricultural economies in which long-term growth rates are small. We suggest that the presence of the first type of cycle can be supported by available (although admittedly poor) data; while the latter is largely reflected in discussion and arguments among the ancients as to how to respond. The occurrence of both type of cycles is mainly attributed to external shocks, such as climate change, natural disasters and sunspot activity. The ancient central government's centralized system and the economic and social policies chosen also serve as important endogenous factors for cyclical economic behavior. As ancient Chinese economists did not pay full attention to the recording and organizing of economic data, more cases of the economic cycle may remain to be found, but the

theories and philosophic thought of economic cycles appears rich. These theories and ideas not only explain and interpret the characteristics of the economic cycle in ancient China to a certain extent, but the policies advocated at the time can serve as an input to the counter-cyclical policy debate of today both inside Chinese and more broadly.

2. Preexisting Analyses of Economic Cycles

2.1 Western Economic Cycle Analysis

Economic cycles reflect the alternate and repeated cyclical occurrence of economic expansion and economic contraction during ongoing economic activities of production and exchange. Western research on economic cycles generally seems to agree that economic cycles can be categorized into short, medium and long cycles. Short-period cycles mainly refer to Kitchin cycles of 3-4 years in length; medium cycles refer mainly to Juglar cycles of length of about 9-10 years; long period cycles include Kuznets and Kondratieff cycles with length of about 20 years and 50-60 years respectively. Schumpeter's "Business Cycles" (1939) set forth the claim that medium cycles are within long cycles, and medium cycles contain short cycles. As for research methods, the majority of western researchers take a non-linear approach to identify stages of business cycle fluctuations, such as Markov shift (Markov Switching) models, Smooth Transition Autoregressive (STAR) models, and threshold autoregressive (TAR) methods, and others.

Cycle theories in Western economic thought can be roughly divided into three categories and correspond to types of economic fluctuations.

First come theories that emphasize monetary factors (Hawtrey, 1913; Hayek, 1931; Friedman, 1956). Non-equilibrium Keynesian analyses in the 1980s also suggested that real economic fluctuations were caused by monetary variables in the short term, but in the long run monetary variables could only change nominal prices.

Second come theories that emphasize market production and consumption behavior and factors influencing them (Sismondi, 1819; Marx, 1859; Keynes, 1936). Greenwald and Stiglitz (1993), for instance, argue that under conditions of the monetary and financial market imperfections, risk-averse behavior of firms and product price instability are the root causes of economic fluctuations.

Third come theories that emphasize external shocks, such as the "Sunspot Theory" due to

Jevons (1875) and the "Innovation Cycle Theory" due to Schumpeter (1939)¹. In the 1970s Lucas and other economists argued that fluctuations in the economy resulted from non-systematic policies of monetary authorities. In the 1980s neoclassical macro-economists, represented by Prescott, Kydland and Plosser, proposed Real Business Cycle theories that suggested that supply factors, such as technology shocks and labor markets were the real causes of economic cycles.

2.2 Research on Modern China's Economic Cycle

In modern China, since 1978 a number of scholars have conducted research on China's economic cycles. Liu Shucheng (2005) and Chen Leyi (2007) argue that since the founding of P.R.China, the volatility of economic growth shows a total of 10 cycles. Xu Feiqiong's (2010) analysis of the relation between agricultural disasters and food production leads to the conclusion of a three-year cycle for the agricultural economy².

Some scholars have also attempted to explore China's special economic cycles taking into account the basic characteristics of China's economic system and structure. By way of example are Brandt and Zhu's (2000) "Soft Budget Constraint Theory" in the transition economy, Chen Dongqi's (1992) "Strong Wave of Economy Theory", and "Unbalanced Structure of Productivity Hypothesis" by Chen Zhang et al (2006), Naughton (1986), Imai (1994), Rawski (2002) and Justin Lin's (2007) present analyses of economic cycles from an investment point of view. By way of contrary, Liu Xiahui, Sun Cunwen, Jia Junxue and Guo Qingwang are concerned about the influence of monetary and fiscal policies on economic cycles. Li Bin (2006), Wang Damei (2007) and Chen Weidong (2010) explain economic cycles through periodic changes in government policies. Other studies include the analyses of Zhao Zhiyun (2010), Wu Xiaobo et al (2011) of technological innovation on the economic cycle.

There are other scholars, especially Chinese scholars, who explore issues of modern

¹ Since the 1970s, scholars such as Mensch, Freeman, and Clark have used modern statistics to support Schumpeter's position. Van Duijn(1977) proposed a theory of innovation cycles, stressing economic fluctuations caused by technology innovations.

² Xu's paper is helpful in understanding that even in the 21st century agricultural economic cycles still exist in classic form. See Xu Feiqiong (2010).

economic cycles in China with different methods and offer interpretation from multiple perspectives. However, few studies are of ancient China's economic cycles. Mitchell (1951) asked whether business cycles occur only in nations where private enterprise prevails and wondered how far can they be traced backwards in history. A natural question, therefore, is whether there were cyclical fluctuations in ancient China's economy. If there were, what were their characteristics? How did ancient peoples respond to economic cycles? When faced with recession, how did the government and the people react? This paper discusses and elaborates on these questions through a discussion of cycles in ancient China.

3. Economic Cycles in Ancient China: Evidence and Explanation

In modern economic cycle research, it is common practice to use quantitative indicators, which reflect the operational status of individual industries, such as prices, trading volumes, employment, and qualitative indicators to reflect changes in economic or industry climate. The conditions in ancient China were much more limited: Firstly, the ancient Chinese government paid little attention to statistical economic data compared to the West in modern times. Data often vanished over long periods and the quantity and quality of the data itself could not be guaranteed; Secondly, ancient China was based on an agricultural economy, and a full monetary economy did not fully develop until the Tang and Song dynasties. For long periods of time, the volatility of the total economy can only be measured by grain production relative to changes in population.

For all these reasons in this paper we claim no fully accurate quantitative analysis about economic cycles in ancient China and take fluctuations in crop production relative to population as a general indication of economic activity. In addition, it was only after the Song dynasty that monetary notes became popular, and after this the economy was likely to have had currency driven fluctuations, but it is difficult verifying this by historical data, and we set it aside for future research.

3.1 Long Run Climate Economic Cycles

In ancient China, agriculture was heavily affected by natural factors, such as climate and drought, or flood disasters. Climate change resulted in changes in crop yields, and also affected the frequency of disasters. This not only directly affected crop harvests, but also affected farmers' choice of crops and therefore indirectly harvests.

The relationship between climate change in ancient China, the grain yield per mu (a measurement for land area in ancient China, 1 mu=0.0667 hectares), and time is shown in Figure 1. Climate warming shortens the growth cycle of crops, increases harvest times, increases multiple cropping and increases yield per mu. In contrast, cold weather leads to a longer growing season of crops, affected cropping and resulted in food production reduction. In addition, more

water with a warm and humid climate was also conducive to the expansion of crop areas. Other research¹ has shown that when other conditions remained unchanged, when the annual mean air temperature decreased by 1 °C, grain yield per mu of the year decreased by 10% of that of average years. When annual precipitation decreased by 100mm, grain yield per mu could also drop by 10%.

In ancient China, natural vegetation was relatively unchanged and soil erosion was not an issue, and it was droughts and floods that were mostly affected by climate. Climate warming tended to reduce the frequency of natural disasters and agricultural production was relatively stable. It was periods of cold climate when natural disasters happened more frequently, and which had a larger effect on agricultural production than the climate cooling itself. For example, when the annual temperature increased by 1 °C, cold damage frequency would be substantially reduced. On the other hand, if the temperature dropped by 1 °C, cold damage frequency would increase significantly and cause food production to decrease.² When faced with extreme weather, considering the uncertainty of future harvests, farmers tended to select adaptable, stable crop varieties rather than only those crops with a high yield per mu.

Cyclical climate change also affected the frequency of change of dynasties in ancient China and through this generalized politically based economic cycles. An example was after Emperor Yuan of the Han Dynasty, the Western Han Dynasty experienced an unstable period of cold climate. From the rule of Emperor Cheng to Emperor Wang Mang, the Western Han Dynasty experienced the coldest climate.³ Cold weather caused harm to agricultural crops and successive years of famine and was a factor in the failure of Wang Mang's usurpation of the Han. In the Eastern Han Dynasty, there was a period of warm climate, but the climate deteriorated again after Emperor Huan of Han. There was a period of cold weather after Emperor Huan. The maximum temperature in spring and summer was lower than usual, and warm and cold weather appeared abnormally. A hundred years after the Emperor Huan's rule, the Eastern Han Dynasty

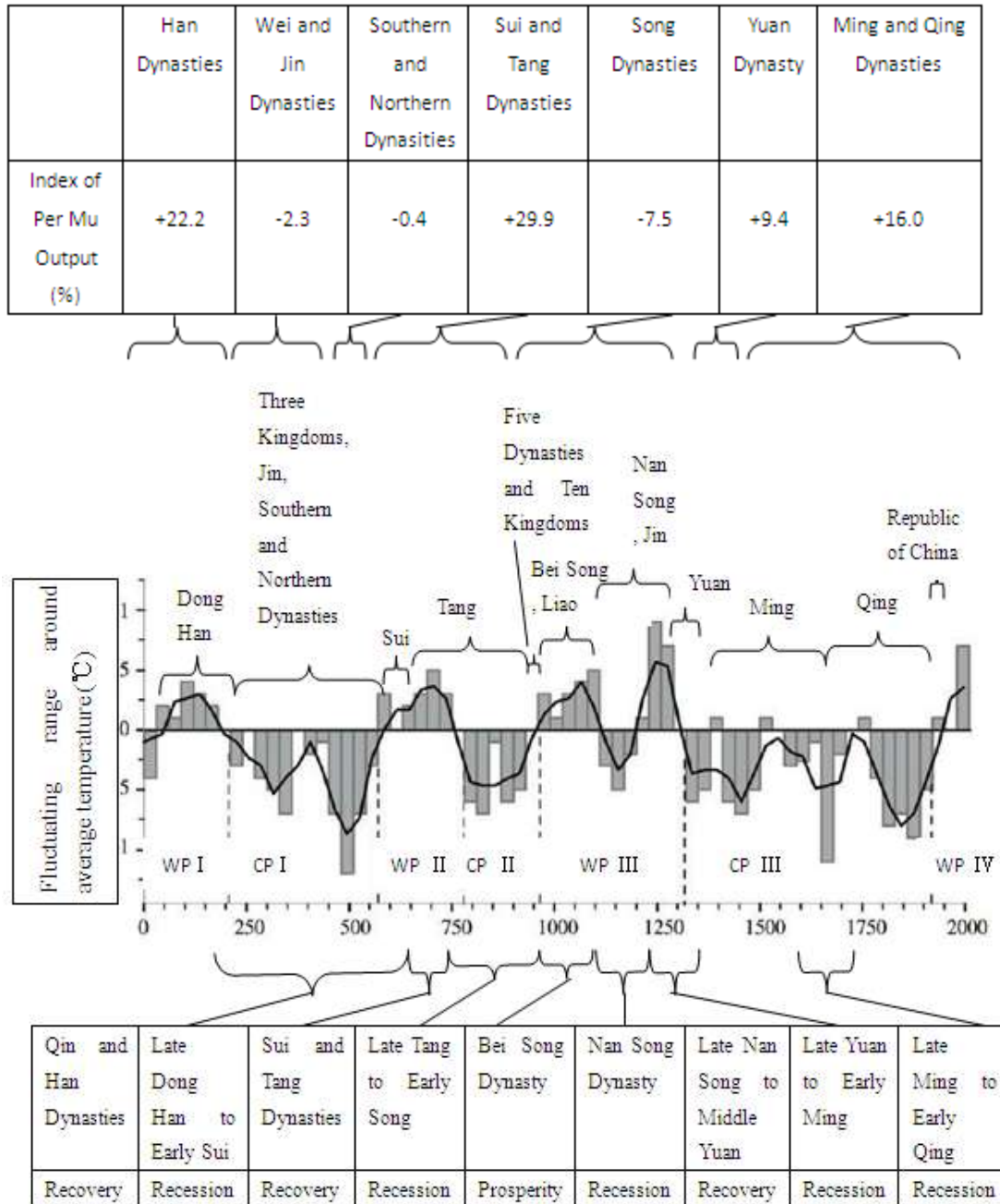
¹ See Zhang Jiacheng (1982).

² See Zhang Jiacheng (1988).

³ See Chen Liangzuo (2005).

collapsed, and dynastic change occurred. Dynastic change in turn played an important role in the fluctuation of economic output, resulting in a political economic cycle.

Figure 1
Output and climate change in Ancient China by dynasty



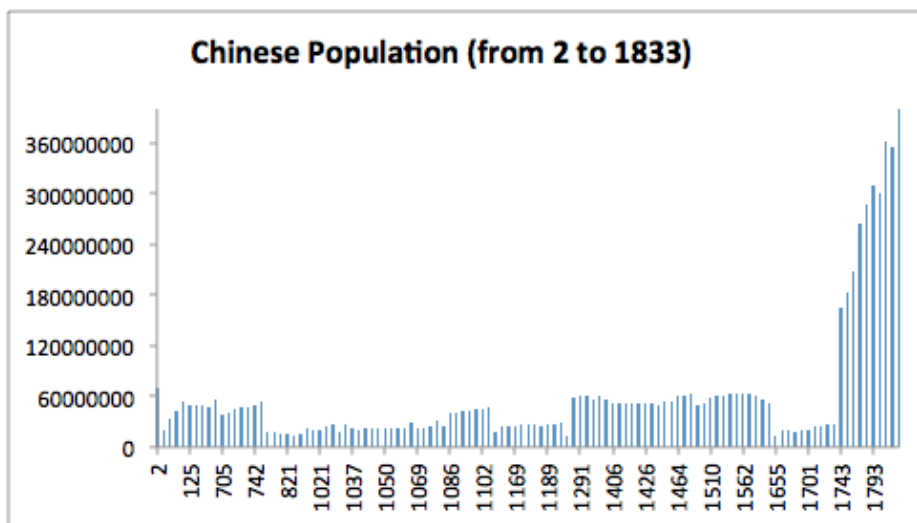
Key: WP- warm period; CP- cold period

Note: Data collected from researches of Li Wentao (2009), Ge Quansheng (2002), He Fanneng (2010) and modified by authors.

3.2 Political Economic Cycle

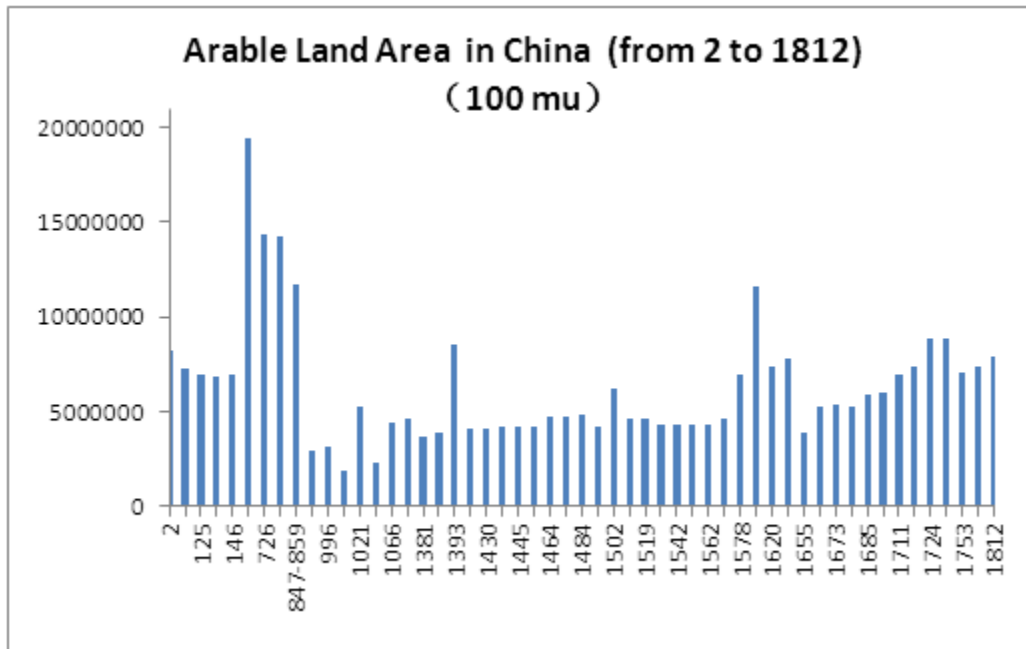
Political factors were also a central feature of economic cycles in ancient China. Fairbank (1989) believed that "China's history is a history of dynasty alternations constantly ... both the Western Han and Eastern Han Dynasty lasted for 200 years. Later dynasties tended to enjoy the ruling for around 300 years in the more advanced historical conditions." When one checks the length of rule throughout Chinese history from Qin to Qing dynasties, the period for the Qin and Sui Dynasties were the shortest (no more than 40 years). The Five Dynasties and Ten Kingdoms Period with the coexistence of local separation of several countries and the Yuan Dynasty which expanded its territory did not rule very long either (no more than 100 years). The Wei and Jin Dynasties were the time periods when the regimes changed the most frequently (up to 360 years), while the other dynasties lasted for 200 to 300 years.

Fairbank (1989) pointed out: "The Chinese view of dynasty's circulation had its reason naturally. This superficial political model at least can generally fit with basic technical, economic, social and cultural development conditions." Then he explains the history of China's dynasty cycle using scale expansion and over-expenditure of the royalty and the resulting adverse consequences. Taiwan scholar Hou Jiaju (1997), in contrast, sees the issue from the point of view of traditional Chinese political and economic system combined with Malthus' theory.



Note: Data from- Liang Fangzhong. *Statistics on Chinese Hukou, population and field in Dynasties*, Zhonghua Book Company, 2008.

In short, both scholars use economic factors to explain regime change. But why did the royalty always expand their scale of expenditure to the extent sufficient to cause social unrest? Why was the overpopulation problem always solved by war? John King Fairbank and Hou Jiaju both believed that in ancient China there were cyclical fluctuations in the economy, and there were roughly coincident with the political cycle.



Note: Data from- Liang Fangzhong. *Statistics on Chinese Hukou, population and field in Dynasties*, Zhonghua Book Company, 2008.

3.3 Short Run Climate Cycle: the “Sunspot” and the Cycle of 12 Years

Ancient Chinese also experienced shorter run cycles reminiscent of the "sunspot" theory (W. Jevons, 1875) that characterized the early economic cycle theory in the West.¹ This theory attributed cyclical fluctuations in the economy to cyclical changes in sunspots and it also argued that the cyclical changes in the sunspot cycle would affect climate change, and this would affect the agricultural harvest, the condition of which would affect the entire economy. The emergence of sunspots was thought to obey certain rules occurring about once every 11 years or so.

¹ See W.S.Jevons (1875).

Therefore, the economic cycle was thought to be about 11 years. Jevons stressed that a successful harvest in any year depends on the weather, especially on the weather in the months of summer and autumn; If the weather is in part dependent on the solar cycle, then the price of grain and harvests will be dependent on the solar cycle and the economy would experience cyclical fluctuations which shared the same cycle as sunspots.

Jevons chose agricultural output rather than monetary or other indicators to show the pattern of economic cycles. This is also the closest to the economic cycle characteristics in agriculture in ancient China. Coincidentally, the ancient Chinese also believed that there existed a short cycle of about 12 years in economic activity.

The historian Sima Qian of Western Han Dynasty (202 B.C. – 9 A.D.) described three cycles involving agricultural harvests in *Historical Records (the part of Collected Biographies of Merchants)*:¹ The first cycle is a medium one of six years which he described as "Six years of harvest and six years of crop failure come in succession" . The second cycle "A serious famine occurs every twelve years " is a long circle of twelve years. This twelve-year cycle can be divided into four stages in detail as follows: "In the year of gold, good harvests always occur; in the year of water, crop failures are always the case; in the year of wood, hunger happens; in the year of fire, drought occurs ".

The two cycles above use the Suixing Chronology combined with the Theory of Five Elements. It takes Suixing(the ancient Chinese for Jupiter) 11.86 years to go once around the sun once. Jupiter stays in one position for almost three years: the gold in the west, the water in the north, the wood in the east, and the fire in the south. Therefore, twelve years is considered a cycle. In the three years when Jupiter is in the position of gold, good harvest comes; when in the three years of water, harvests are poor; famines happen in the three years of wood; droughts occur in the three years of the fire. The five elements did not mention the soil. Located in the center with no direction, years of soil can probably be considered average for agricultural output. The cycle of twelve years can be subdivided into two six periods, one of which will turn out

¹ See Zhang Wenjiang(2010)& Hu Jichuang (1988).

better, and the other of which will be worse off. Generally, every twelve years is considered a cycle, at the end of which relatively large famines happen.

In addition, Sima Qian depicted a more detailed cycle: “when Taiyin is in the terrestrial branch of Mao, harvests are good, and in the following two years it worsens; when Taiyin is in the terrestrial branch of Wu, droughts happen, and the following two years the harvest are good, not abundant though; when Taiyin is in the terrestrial branch of You, there are rich harvests, and in the following two years it worsens; when Taiyin is in the terrestrial branch of Zi, serious droughts happen and there will be harvests in the following two years and precipitations are abundant.” The Taiyin here is Taisui, which is a virtual celestial body invented by the ancient Chinese. Its orbit overlaps with Jupiter’s orbit and goes around in an opposite direction with Jupiter. We can see this division in more detail in that every year is a stage of a three-year cycle and there are altogether four three-year cycles which add up to a full cycle of twelve years.

In general, the economic cycle mentioned in Sima Qian’s *Collected Biographies of Merchants of Historical Records*, is a time period of twelve years. The description in the *Book of Huai Nanzi* “Crop output sees a decline every three years. Famine happens every six years and a serious crop failure occurs every twelve years” and the words in *On Salt and Iron* “Famine happens every six years and a serious crop failure takes place every twelve years” together are secondary evidence for the above conclusion.

In 1843 Samuel Heinrich Schwabe found that solar activity shows a cycle of 11 years, following this, a large number of scholars conducted research that further expanded on this observation. The ancient Sunspot Records Research Group of Yunnan Observatory (1976) has carried out analysis of the 112 sunspots recorded in history (43 B.C. to 1638 A.D.) and drew the conclusion that the sunspot activity show a cycle of 10.60 ± 0.43 years. Moreover, Luo Baorong et al. (1978) carried out autocorrelation and spectral analysis of ancient Chinese records of the Aurora (207 B.C. to 1517 A.D.) and earthquakes (70 B.C. to 1643 A.D.) and found that there is cycle of 11 years for both (Aurora : 10.54 ± 0.27 years; Earthquake: 11.06 ± 0.40 years), which is consistent with the eleven-year cycle of solar activity. This suggests that

the cyclical change of earthquakes and other geophysical phenomenon are related to changes in solar activity, and the 11-year cycle of solar activity has existed at least for the past 2,000 years.

Ye Qingchao (1994) has also done research on the sequence of drought and flood changing of Xi'an area in Northwest China for up to 1724 years finding that it is close to "a serious drought in a decade". He has also reconstructed the precipitation sequence in Luoyang in Henan over the past 750 years based on the tree-ring chronology with the results showing an oscillating cycle of 11 years or so. The change of dry and wet growing seasons in the region generally reflects the occurrence of droughts and floods. China's most famous meteorologist Zhu Kezhen (1973) has compared the number of sunspot incidents in official historical records with the number of severe winters and found that the larger the number of sunspots, the more the number of severe winters, from which climate change can be speculated to be correlated with sunspot activity.

Although it is difficult to find detailed records of meteorological and agricultural harvests from 2,000 years ago, it is definitely not a coincidence that the cycles mentioned above are strikingly similar to Jevons' "sunspot" cycles. As for the twelve-year cycle, there is a section in the eighteenth chapter of Censorinus' *on the birth (De Die Natali)* in the third century A.D. saying: "This is very similar to the cycle of twelve years period length (*dodekaeteris*). It is called Chaldeans (*annus Chaldacius*), which is derived from the observation of other celestial bodies by the ephemeris experts, rather than by observing the movement of the sun and the moon. A speculation is that in one year period, the cycles of harvest and disease and other cycles of weather are all coincided with this observation."¹ Joseph Needham cautiously believed that "It is not impossible that sunspots were related to huge social issues like the crops output through the influence of climate changes." He also quoted the research result of Arakawa to demonstrate that this relation existed from the rice output records of Japan after 1750.² From this, we can see that an understanding of the twelve-year cycle, and its relation with harvest abundance is an important achievement in early thought in both the East and West.

¹ See Joseph Needham (1975).

² See Joseph Needham (1975).

4. Key Concepts in Ancient Economic Cycle Discussion

Underlying the discussion and analysis of economic cycles in ancient China were key philosophical ideas as well as specific writings on the best policy response to cycles.

4.1 The Philosophical Basis for Discussion of Economic Cycles in Ancient China.

4.1.1 The Concept of Economic Cycles in *the Book of Changes*

Key to the whole discussion of economic cycles in ancient China was acceptance of the notion of cycles as a key point of all existence. *The Book of Changes (I Ching)* is the oldest and most profound of the classics from ancient China, and is said to be summarized and revised according to Fu Xi's remarks.¹ It is still regarded as the high point of Chinese wisdom and culture for five thousand years, and is honored as “the head of classics and the source of truth”. In ancient China, *The Book of Changes* was the theory for emperors, and provided the necessary support for activities of statesmen, militarists and business men. *The Book of Changes* is essentially a book about divination. “Divination” refers to making predictions on future developments, while *the Book of Changes* is the book that summarizes the regulatory theory of predictions. Most Chinese people believe that *The Book of Changes* summarizes the law of development for all things in the world, and bears mysterious powers and can make predictions and explanations for everything.

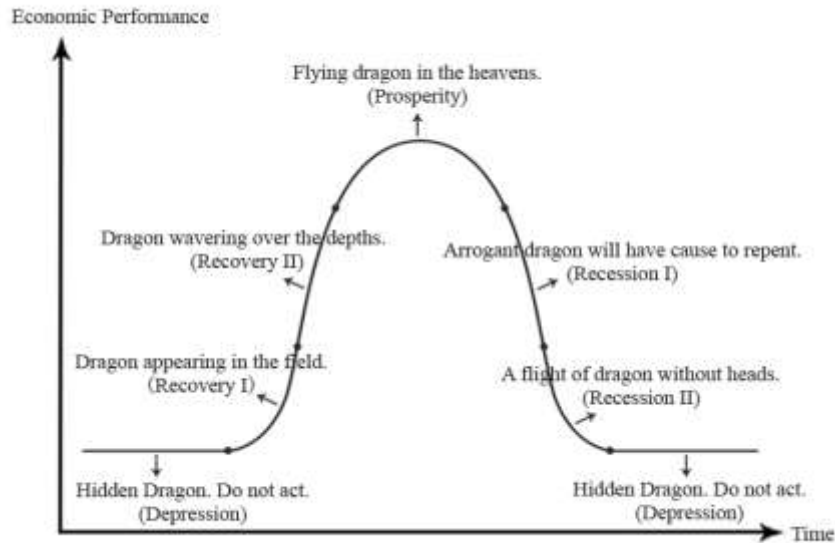
The relevant description and explanation of economic cycles can also be found in *The Book of Changes*.² The first Diagram in *The Book of Changes* is “the Qian Diagram”, the contents of which are illustrated below in Figure 2:

¹ See “The Book of Changes”, *Xi Ci Second Part. Chapter 2*.

² See Yang Huiyan, Guan Xiaoli (2010).

Figure 2

Economic Cycles Model Analysis using *The Book of Changes*



The Qian Diagram implies a complete circulation with characteristics of contraction and expansion as well as phases of prosperity, recession, depression and recovery. The corresponding economic cycles are as follows: “Hidden Dragon. Do not act” refers to the economy that in a slump or depressed state in which it is hard to do anything; “Dragon appearing in the field” implies an economic recovery, in which successful people can take the opportunity to succeed; “The energetic gentlemen work hard all day” means keeping vigorous through the whole recovery phase, and no one can relax at any time. Being certain about the target and achieving it with effort and prudence, there will be no great harm even if in the face of risks; “Dragon wavering over the depths” refers to the phase from depression to recovery. During this rising period, the average social profit rate is high and almost every business runs smoothly; “Flying dragon in the heavens” refers to the most economically prosperous period; “Arrogant dragon will have cause to repent” refers to recession in the economic cycle, which suggests things will develop in the opposite direction when they reach an extreme; “A flight of dragon without heads” indicates that in the prosperous period, monopoly will emerge, while after the economy enters

recession, monopoly would disintegrate and be replaced instead by a pattern of free competition, which is a symbol of good performance for the economy.

There are scholars who believe that “Shi” (Time) is the basic spirit of *the Book of Changes*, and this means to be prepared to change at any time and to keep up with the times.¹ Every diagram also has its own “Diagram Shi” among the sixty-four diagrams in *the Book of Changes*. Among the six Yaos of every diagram, every Yao also has its “Yao Shi”. Different “Diagram Shi” and “Yao Shi” are in specific phases of periodic cycles. Apart from the “Diagram of Qian”, other diagrams in *the Book of Changes* also serve to some extent to explain the phenomenon of economic cycles.

4.1.2 Naturalism in *Dao De Jing*

Dao De Jing is another mystical classic from ancient China, which was generated in the Spring and Autumn Period (about 571 B.C.-471 B.C.). Its author is said to be *Laotzi*. This book was not only the most important philosophical work in Pre-Qin Dynasty, but also is regarded as the basic record of Daoism.² *Dao De Jing* uses "Dao" to explain the evolution of everything in the universe. "Dao" generated the universe. The regulation of yin-yang was formed with the universe. The heaven, the earth and humans emerged within yin-yang; and finally all things came into being". "Dao" means "Give everything the power of development and do not interfere." Thus, "human beings learn from the norm of the earth, while the earth is restrained by the law of heaven, the heaven is restricted by the rule of Dao, and Dao is finally regulated by the norm of nature".

Dao De Jing represents the dialectic point of view, which advocates that everything has two opposite sides. For example, “existence and disappearance are born in mutual confrontation, difficulty and ease are formed by mutual opposition, long and short are reflected by mutual exclusive, high and low exist in mutual confrontation, sound and voice keep harmonious due to mutual opposition, while front and back emerged by mutual exclusive.”

¹ See Liao Mingchun (2004).

² Taoism is China's native religion, which came into being in the last years of Eastern Han Dynasty.

In *Dao De Jing*, all things on earth not only own contradictory sides, but can change into each other. “Justice can change into distortion at any moment, while goodness can turn into evil”. “Misfortune might be a blessing disguise”, namely “the movement towards opposite direction of things are the result of Dao”.¹

In the four stages of an economic cycle, "prosperity" and "depression" are a pair of opposite contradiction, while "recession" and "recovery" are another pair. However, any of the stages cannot remain for long, and will inevitably evolve into a next stage when reaching a certain critical point. After the completion of circulation from prosperity to recession, then depression, and finally recovery, the economic cycle will evolve to the next circulation. In the thought of western economists, the natural tendency of all economic activities is to achieve "a Walrasian equilibrium", in which demand is equal to supply: consumers maximize utility; entrepreneurs obtain maximum profit, and owners of factors receive their rewards. The different forces in economy offset and restrict each other, which keeps the economy in a relatively steady state.

The characteristics of stages and rules of movement in the economic cycle predicted early in *Dao De Jing* are similar to that evolved as *Mitchell's* view of the business cycle in the 1940s. He argued that cycles create their own cycles to follow, and that cycles are part of the Smithian invisible hand behind economic order.

4.2 Thought on Stabilizing Economic Cycle in Ancient China.

Besides basic concepts and early thoughts on economic cycles in China, substantial debate occurred on how to stabilize economic activities.

4.2.1 Demand Management Policy by *Guanzi*.

Guanzi is said to be the record of thoughts and remarks by Qi's famous premier Guan Zhong and his School in the Spring and Autumn Period, which was between 475 B.C. and 221 B.C. In this work, the author shows a deep understanding of the changing rules of both the

¹ There are two explanations of “opposite”. One is contrary or relative; the other is the same as back to front with its meaning of repeating or circulating. In Laotzi's philosophy, these two meanings can be alternatively used on different occasions, while the two meanings may be both expressed using "opposite". Feng Youlan (1996), the most famous philosopher in modern China believed that “the movement towards opposite direction of things are the result of Dao” is the essence of *Dao De Jing*.

natural world and social economy, and proposed countermeasures. The most prominent of these ideas are for consumption stimulation.

According to Keynesian economics, effective demand is usually insufficient at the low point of a business cycle; National income is not consistent with full employment. The way for government to achieve full employment equilibrium is to implement management policies of total demand, or, effective demand, which is demand management policy. According to this theory, when the economy is in recession with low aggregate demand, the government should use expansionary fiscal policies such as cutting taxes, increasing spending to stimulate demand, expand employment, and promoting economic recovery and development. Broadly speaking, monetary policy for the purpose of simulating demand also belongs to the demand management policy such as lowering interest rates.

Thought on demand management policy as well as fiscal and monetary policies is all covered in *Guanzi*. There are extensive discussions on the proper fiscal policy that should be undertaken during an economic depression in the Chapter *Cheng Ma the sixty-ninth* of *Guanzi*. “When people lose their fundamentals of living in years with frequent floods and droughts, the monarch can recruit those who live in extreme poverty and give them payment through the activities like constructing the palace. Therefore, the purpose of constructing pavilions is to appease national economic fluctuations rather than for enjoyment.”

This is the earliest description of policy in Chinese history with characteristics of Keynesianism. It remains unknown whether Keynes ever read *Guanzi*, but it is undoubtedly the case that some dominators of vassal states in the Spring and Autumn in the Warring States Period purposefully used expansionary policies to stimulate demand.

Quite apart from increasing public spending to respond to economic cycles, *Guanzi* also advocated measures to stimulate demand from another perspective. In Chinese traditional culture, the advocacy of thrift is the ideology that holds a predominant position.¹ For thousands of years,

¹ Zhao Jing (2002) lists "abolishing luxury and advocating thrift", "valuing morality and despising interest" and " thinking highly of essence and restraining nonessentials" as three important doctrines of history of economic thoughts in ancient China.

both the government and civilians were proud of frugality and felt ashamed of luxury. *Guanzi*, however, developed a unique idea that advocated the encouragement of luxury consumption with its obvious purpose of increasing wealth, controlling the macroeconomic situation and ensuring smooth economic operation.

The Chapter *Extravagance the thirty-fifth of Guanzi* states that " Huangong, Prince of the Qi State asked how to increase wealth and goods that go with the change of time and conditions, Guan Zhong replied that 'there is no better way than implementing extravagant consumption. Despising practical things and respecting useless things will comply people to obey.' Therefore, disregard food and cherish jewelries, take pleasure in ritual and look down upon production." Guan Zhong also said in the same chapter that: "For the purpose of increasing wealth, surplus food should be used for extravagant consumption, the cart and horse should be decorated before being driven, and tasty wine should be brewed for enjoyment. In that way, poverty and begging won't come into being in a thousand years, which is called the fundamentality of wealth accumulation."

To more fully illustrate extravagant consumption, *Guanzi* mentioned "carving and painting the egg before eating, enchasing the firewood before burning." The reason is that "extravagant consumption of rich people can create jobs for poor people, while people's livelihoods should be formed by mutual help between the rich and the poor."

Agriculture dominated economy in ancient China, and the literature that focuses on monetary issues is relatively scarce,¹ however, *Guanzi* is an exception. Targeting economic depression caused by climate change, *Guanzi* proposed countermeasures from a monetary policy perspective. It is mentioned in the Chapter *Shan Quanshu the seventy-fifth of Guanzi* that "In the time when Shang-Tang was in power, he encountered seven-year severe drought and Xia-Yu's period suffered five-year flood, and some of the people even chose to sell their children. Shang-Tang casted coins by the metal produced from Mount Zhuang to save those who sold their children due to poverty while Xia-Yu did the same by metal produced from Mount Li." What the

¹ See Zheng Xueyi, Zhang Yaguang, John Whalley(2013).

author demonstrates here is the importance of a national calamity reserve.

In a situation with a primitive social-economic structure, why not take other measures to relief calamity rather than only creating new currency? The reasons are set out in another chapter of *Guanzi*: "Using wealth and goods is an effective way to control people. They purchase devices by wealth and goods, while wealth and goods will go into the market for profit if not used for device purchasing." Viewed from the point of view of understanding the role of money in *Guanzi*, this text sets out the transmission mechanism and the basic influence of monetary policy on the economy in ancient times, and hence mechanisms to cope with periodic economic fluctuations.

4.2.2 Price Stabilization and Geng Shouchang's System of "Ever Normal Granary" in Ancient China.

Since the economy in ancient China showed obvious characteristics of natural cycles, fluctuations in agricultural production and food prices attracted the most attention. In favorable climate and harvest seasons, prices would generally fall, while in calamity with flood or drought, prices would generally increase. Frequently occurring price fluctuations not only had significant impacts on economic activity, but also threatened the dominance of specific dynasties in severe cases.

How to deal with fluctuations in food prices is related to the broader issue of stabilizing economic cycles. A classic statement on food price stabilizations in the *Treatise on Food and Money (Shihuo Zhi)* of *Chronicles of the Han Dynasty* that "High price of grain is very unfavorable for people who live on crops; While farmers who cultivate food will suffer great loss when the food price is too low. People will become homeless when they are unable to afford their living, and the state will fall into poverty when it is unprofitable for farmers." A Chinese old saying of "Low prices for grain hurt the peasants" that passed down for 2000 years derived from this statement.

Compared with other commodities, the biggest difference for grain is its longer production cycle. In a perfectly competitive system of free markets, when a gap appeared between supply and demand caused by external shocks, the food output gap could not be bridged by relying

solely on price adjustments since famine and social instability would also appear. Therefore, an approach of intervening in food markets had long been advocated in ancient China.

According to the record of *Biographies of Merchants of Historical Record*, Yue State in the Spring and Autumn Period (770 B.C.-476 B.C.) had already implemented the policy of "Fair Selling". Ji Ran (Birth and Death is unknown, teacher of the famous minister Fan Li of Yue State) pointed out that farmers will suffer losses by selling food at a price of twenty coins per bucket, while the profits of businessmen would be harmed by selling food at ninety coins per bucket. The losses of businessmen would hamper the circulation of money in society, while the losses of farmers would lead to barren land.

On the basis of an analysis of the relationship between grain price fluctuations and the wider economy, Ji Ran proposed a fluctuation range for grain prices: "the price per bucket of grain should be no higher than eighty coins and no lower than thirty coins, which can benefit both farmers and businessmen." Grain was to be sold at "fair" prices, so as to stabilize and adjust prices of other commodities, with no taxation of market supply he argued was the proper way for state management.

The national food reserve system of Wei in the Warring States Period (475 B.C.-221 B.C.) is recorded in detail in *Treatise on Food and Money of Chronicles of the Han Dynasty*. "The state purchases three quarters of food in abundant harvest, two-thirds of food in average harvest, and a half in small harvest. The critical point of acquisition is to reach the status of satisfying people with no further decrease of food prices. Once calamity occurs, the state will put corresponding amounts of food reserves according to the degree of disaster and sell it on the market for the purpose of pulling down the food price."

Sang Hongyang (152 B.C.-80 B.C.), the Chancellor of the Exchequer in Western Han Dynasty, expanded the same idea of stabilizing grain prices to all commodities, and set up a system of "stabilization" with its principles and measures identical with "Ping Di" and "Ping Tiao", both of which stabilized prices by national forces. Geng Shouchang (active 91 B.C.-49 B.C.), the Chancellor of the Exchequer and astronomer in the Western Han Dynasty formally

established the famous system of "ever normal granary".

It is recorded in *Treatise on Food and Money of Chronicles of the Han Dynasty* that "(Geng Shouchang) ordered the counties to build granaries. When the food price was low, grain was bought by the government to push up the grain price and benefit farmers, while grain was sold out to lower the price when the price was high, namely ever normal granary."

The system of "ever normal granary" of ancient China made a significant contribution to western economic theory. Chinese governments saved millions of people and reduced disaster cycles one after another using "ever normal granary". It was not until nineteen hundred years later that the United States discovered the enormous value of this system and applied it to its agricultural economic policy. In 1938, the "ever normal granary" system was written into the U.S. Agricultural Adjustment Act. President Roosevelt believed that this system could overcome fluctuations in agricultural production caused by climate change, balance the price of agricultural products and protect the interests of consumers. Bean (1937) pointed out that it was the combination of modern invention and China's idea of "ever normal granary".¹ It is also worth mentioning that due to the complex risks associated with modern capital markets, the government also undertook reverse operations to iron out the volatile irrational fluctuations in securities by the wide use of "buffer funds" or "intervention funds" for the purpose of stabilizing stock markets. The idea of reverse operation also originated from the system of "ever normal granary" in ancient China.

4.2.3 Instances of Counter-Cyclical Measures being used in Ancient China: Wan Anshi, Fan Zhongyan, Ji Ran and Bai Gui

Deeply influenced by the idea of "abolishing luxury and advocating thrift", China's governments across dynasties were cautious in implementing expansionary fiscal policies. When in an unfavorable economic situation, they were more inclined to choose adjustments based on "reducing corvee and cutting tax"², and less willing to choose activist intervention policies like

¹ See Li Chaomin (2000).

² Ban Gu, "Chronicles of the Han Dynasty", *Biography of Emperor Zhao*

increasing public expenditures and stimulating consumption. In the view of most emperors and senior officials in charge of economic management, massive construction projects became linked with "exploiting the people and wasting money"¹, which caused great psychological pressures for them even in times of economic prosperity, let alone economic downturn.

The *Su Shui Ji Wen (Volume Fifteen)* in the Northern Song Dynasty (906 A.D.-1070 A.D.) recorded a story of a famous prime minister of reform Wang Anshi (1021 A.D.-1086 A.D.). "Wang Anshi liked to talk about how to gain economic interest. There were timeservers who suggested absurdly that drawing off a circumference of 800 li's water of Liangshan Moor and replacing it by farmland would make considerable profit. Wang was very pleased to hear that and asked where to keep the draining water. Liu Ban (1023 A.D.-1089 A.D.) suggested digging a lake of circumference of 800 li next to the farmland. Wang laughed and then gave up this idea." It is possible that Keynes felt regret on learning about this story, because both farmland transformation and lake building are typical measures of expansionary fiscal policy, while it was thought unnecessary and to be condemned in Chinese traditional thought.

However, Fan Zhongyan (989 A.D.-1052 A.D.), another representative of reform in the Northern Song Dynasty had a different understanding. It is recorded in *the Dream Rivulet Diary (Volume Twenty-six)* that in the second year of Huang You period in Song Dynast (1050 A.D.), the province of Wu suffered severe famine. Fan Zhongyan, the governor of Western Zhejiang encouraged people to hold a rowing competition and asked the abbots to construct temples on a large scale. Fan Zhongyan explained that:" The reason to encourage feasting and rowing on the lake as well as constructing temples and official residences is to benefit poor and helpless people with the extra money of rich people, and provide working opportunities by both government and folk organizations for people who live on physical work, which can keep people living in their hometown and avoid starving to death in wilderness." Only people living in Hangzhou and areas nearby (Fan Zhongyan's ruling area) didn't suffer severe disaster in the national famine that year.

Chinese scholar Wu Hui commented: "This theory² had been applied consciously by Fan

¹ "The Book of Changes", *The Jie Diagram*

² Refers to the above mentioned demand management thought of *Guanzi*.

Zhongyan in 11th century in China. In Western Europe, it was not until 17th century that William Petty proposed to spend more on things like ‘Entertainments, magnificent Shews, Triumphal Arches, &c.’ in order to provide more income to those who engaged in these jobs.....It is indeed something rare and deserving praise for Fan Zhongyan to own such high level of understanding and practical experience as early as 900 years ago.”¹

The phenomena of economic fluctuation not only caught the attention of theorists and officials in ancient China, but also became one of the foci of businessmen. The previously mentioned twelve-year agricultural cycle theory of Sima Qian was reported by Ji Ran and Bai Gui (370 B.C.-300 B.C.) in *Historical Records*. Ji Ran had a protégé named Fan Li (536 B.C.-448 B.C.), who was the most famous rich man in ancient China, while Bai Gui was respectfully called "the Originator of Theory for Making a Fortune" and worshiped as the ancestor of Chinese businessmen. Fan Li and Bai Gui used their understanding of the economic cycle to execute counter-cycle operations, and ultimately accumulated large amounts of wealth.

According to the agricultural cycle of “Bumper harvest in golden year, crop failure in water year, famine in wood year, drought in fire year...A harvest for every six year, a drought for every six year, and a severe famine for every twelve years”, Ji Ran worked out a strategy for Fan Li that "purchasing boats in drought days while buying vehicles in flooding days". The implication of this strategy was that drought would lead to greater losses for the agricultural harvest in areas of higher ground, while areas of lower ground with enough water would enjoy bumper harvests, so boats are needed to purchase cheap commodities from lower ground. On the contrary, areas of lower ground would be severely affected by disasters in flooding years, while the condition was better in higher ground, thus vehicles would be needed to transport commodities from these areas.

Bai Gui was also good at "observing time changing", which means making use of observations of the economic cycle to predict changes in market conditions. It was Bai Gui who discovered the detailed twelve-year cycle. "The drought will occur when the Taiyin is in Wu

¹ See Wu Hui (1995).

position, while the situation will get better in the following year. There will be a bumper harvest when Taiyin is in You position, while the situation will become worse in the coming year. The country will suffer great drought when Taiyin is in Zi position, while there will be a bumper harvest next year with rain." His basic principle to achieve wealth was "take what others abandoned and offer what they need". As for commodities in excess of supply that attracted no attention, Bai Gui took the opportunity to purchase them, and then sold at higher prices when they were in short supply. This strategy of counter-cyclical operation was the same as Ji Ran's.

5. Summary and Concluding Remarks

Most Chinese lack detailed knowledge of Western economic theory and thought, and are not clear about many of the concepts. However, it is quite easy for them to understand the meaning of economic cycles given the long discussion of them over the dynasties.

China's ancient civilization originated from the higher elevations of the Yellow River. Chinese ancestors had long discovered natural laws through observation and records, and linked these laws with human social activities.¹ Agricultural production, from sowing in spring and cultivating in the summer to harvesting in the autumn and storing in winter, encountered time cycles, which moved the starting points back from one year to another. Through astronomical observations, people also found cycles longer than seasonal movements. Thus, people in ancient China came to the view that all things on earth move and develop in cycles and circulate endlessly, including agricultural production and star movements. They viewed the circulation as the law of everything and firmly believed that human activity, society and history cannot escape this endless process.

In Chinese thought, the theory of cycles can be found everywhere: Tai Ji and the Eight Diagrams derived from *the Book of Changes* all move in circles, the starting and finishing points of the five elements coincide, while the ten Heavenly Stems and twelve Earthly Branches all described the cycle from initiation to death of vegetation. There are sixty combinations of Heavenly Stems and Earthly Branches and these form a cycle of sixty years as a "Jia zi". In addition, there are also political cycle theories such as "Five Virtues" and "Three Colors Cycle", which are all closely related and exhibited unique features of geographical climate, mode of production and political structure in ancient China.

Even though only the theory of "twelve-year cycle" proposed by Sima Qian in *Biographies of Merchants of Historical Record* directly depicted clear economic cycles in ancient China, the broader cycling theories provided the basic intellectual tools for Chinese people to understand

¹ There was a famous ancient folk song: Work when sunrise and rest when sun set, dig well for drinking and cultivate farmland for eating. The power of emperor means nothing for me.

the laws of economic fluctuation, especially the description about stages of prosperity, recession, depression and recovery in *the Book of Changes*, and the philosophy of opposite statuses' mutual transformation towards each other. These explained moving laws of economic cycle and accustomed Chinese people to a variety of cyclical phenomenon by hardships over thousands of years.

Compared with the discussion of economic cycles, the empirical analysis of economic cycles in ancient China was weak. According to the literature, our belief is that there were economic cycles in ancient China, which could be generally divided into two types--long period (200 to 300 years) and short period (12 years). The former can be supported by rough data, while the latter existed largely in discussions among the ancient people. The occurrence of both long period and short period cycles were mainly caused by external shocks such as climate change, natural disasters and sunspots. The centralized system of government and economic and social policies were also important reasons for cyclical economic fluctuation.

Because of long period political economic cycles in ancient China all of the economic polices in the early period of dynasties were counter-cyclical in nature. These economic polices can be presented in four types:

- a. Recuperation. This was the basic economic policy in the early period for the great majority of dynasties with its contents being reducing land tax and eliminating corvee, the most famous of which is "the Governance of Emperor Wen and Jing" in the early Western Han Dynasty.
- b. System innovation. This mainly refers to the reform of the land and tax systems. For example, the first Emperor of Qin promulgated a decree of "commanding people to report the amount of land they owned to the government" in 216 B.C, and legalized the private ownership of land.
- c. Technological innovation. Technological innovation in agricultural production developed at low speed over the past thousands of years in ancient China. A typical example of innovation was the widespread use of cattle farming in the early Eastern Han Dynasty.
- d. Water conservancy. Western scholars who have performed in-depth research on the history of

Chinese water conservancy¹ generally believe that Chinese social structure and cultural traditions are closely related to water conservancy projects. There were large-scale projects of water conservancy for farmland construction in the starting periods in Song, Yuan, Ming and Qing Dynasties.

These four types all reflect counter-cyclical economic policies commonly used by successive dynasties in ancient China. From the perspective of modern macroeconomics, "recuperation" and "the construction of water conservancy" are typical of demand management policies of Keynesianism, while "technological innovation" belongs to supply management policy. "System innovation" is more general with the contents of both demand and supply management policies.

"Technological innovation" may occur in any stage of economic cycle. The social pattern of "Super-stable Structure" that existed for more than 2000 years in ancient China was a rare long-term environment that was unfavorable for the promotion of "system innovation".² Therefore, recuperation and the construction of water conservancy were the most common counter-cyclical measures when China faced economic depression in ancient time.

The former was granted to people by governments who advocated the idea of "inaction (Wu Wei)", while the latter was the positive action of government to combat depression. The logic behind both of them was government intervention. It is easy to understand why Keynesianism could later be quickly accepted after it entered China through Chiang Kai Shek's Nanking government and the Beijing government since reform and opening up in the 1970's.

Chinese sage Laotzi wanted people to know that the world we live in is unsafe and that when one thing reaches its peak, it will fall into the bottom in no time. It is necessary to use a tender, humble, contented and cautious philosophy of life to avoid the damage caused by changes and fluctuations. In that way, people will have leeway even if a crisis comes and look forward to the next peak with confidence. Therefore, Chinese people are both conservative as well as optimistic. Just like Ji Ran, Fan Li and Bai Gui, regardless of drought or flood, good year

¹ Such as American Sinologist Wittfogel, K.A, French scholar Christian Lamouroux and Pierre Etienne Will.

² See Jin Guantao, Liu Jinfeng (2011).

or bad year, they can always find good opportunities for making a fortune. The same ideas apply to countercyclical government interventions and Keynesian policies since the 1930's.

Our view is that it is so difficult to quantify the severity of the cycles of the past in ancient China that proving the severity of economic cycles several thousands of years ago from empirical estimates is not realistic. But the ideas about cycles in ancient China were similar to those of 19th century economics and also Wesley Clair Mitchell's later qualification reflects some of their ideas. Little of this was likely communicated to the western economists formulating their theories, but the presence of cycles in ancient China seems to us to be clear, as well as ideas on appropriate policy response.

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