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On the economic long wave

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Abstract

Purpose – There exist long-term fluctuations in the process of capital accumulation. The economic long wave is an essential part of research into non-mainstream western economics. After the Second World War, the capitalist world experienced the fourth long wave of expansion and then entered into a downward phase of the long wave in the 1970s. Regarding to whether a new long wave of expansion took place in the 1980s, left-wing scholars hold different viewpoints. The purpose of this paper is to focus on this issue.

Design/methodology/approach – First, based on the review of the long wave history, this paper discusses three kinds of long wave theories with significant influence and puts forward the theoretical framework of analyzing the long wave of capitalist economy. Next, under the guidance of this theoretical framework and in combination with the actual development and evolution of the capitalist economy, the issue of whether the fifth long wave of the capitalist economy began to emerge in the 1980s is discussed deeply.

Findings – This paper argues that, from the early 1980s to 2007, the US-dominated developed countries experienced a new long wave of expansion driven by the information technology revolution, the adjustment of the neoliberalism system and the economic globalization. However, the financial-economic crisis of 2008–2009 led to a new phase of long wave downswing.

Originality/value – This paper does not agree with the single-factor analysis of the intrinsic formation mechanism of economic long wave and sticks to the multi-factor analysis centering on the fluctuation of accumulation rate. It is pointed out that the evolution of the long wave of capitalist economy depends on the combined influence of technology, institutions and market. The study of the long wave of the economy will help us to correctly understand the historical stage and characteristics of the current world capitalist economy in the long-term fluctuations, so that we can make an appropriate and positive response.

Keywords Capitalist economy, Long-term fluctuations, Financial-economic crisis, Long depression

Paper type Research paper

1. Long-term fluctuations in the process of capital accumulation

Long-term fluctuations in the development of capitalist economy, also known as the Kondratieff Long Cycle, have been studied by non-mainstream Western economists, and there are already many different viewpoints and arguments upon this topic. Due to a lack of strict definition of the time cycle and reasons for long-term fluctuations, scholars prefer to refer to it as “long-term fluctuations” or a “long wave” rather than a “long cycle.”

First, this paper will look back in history for the existence of long-term economic fluctuations in the development of capitalist countries. Empirical observation first involves the selection of economic indicators reflecting economic fluctuations. The early long wave scholars paid more attention to price fluctuations, while the later scholars put more emphasis on the fluctuations of industrial production and overall national output. It is clear that observing the long-term economic fluctuations with regard to the industrial production or the growth rate of national output is more in line with the substance and nature of economic activities. Next, this paper will consider the growth rate of industrial production, of total output, of the gross domestic product (GDP hereinafter), as well as the long-term fluctuations of world industrial production in the major capitalist countries from the middle of the nineteenth century to the 1970s.



According to the actual situation of economic changes in historical development, long wave scholars generally believe that the major capitalist countries have experienced four or five long-term fluctuations. Because of the differences in focus, the views of the long wave scholars were not completely consistent on starting, ending and turning years of each long wave, but they did not differ greatly in their choice of key years except for Rostow. According to the opinions held by most scholars, the long wave in the history of capitalism can be roughly classified as follows: the first long wave, from 1790 to 1848, with the upward phase between 1790 and 1815, and the downward phase between 1815 and 1848; the second long wave, from 1848 to 1896, of which the upward phase was between 1848 and 1873, and the downward phase was between 1873 and 1896; the third long wave, from 1896 to 1948, where 1896–1929 was the upward period, and 1929–1948 was the downward period; and the fourth long wave, starting from 1948, where 1949–1973 was the upward period.

Table I.
Long-term
fluctuations in the
growth rate of
industrial production
in major capitalist
countries (from mid-
nineteenth century to
the 1970s)

Table II.
Long-term
fluctuations in the
growth rate of total
output in major
capitalist countries
(from the mid-
nineteenth century to
the 1970s)

Table III.
Long-term
fluctuations of the
growth rate of world
industrial production
and the growth rate of
the total GDP of
16 capitalist
countries (from the
mid-nineteenth
century to the 1970s)

		Juglar cycle	The growth rate of world industrial production	The growth rate of total GDP of 16 capitalist countries
The second economic long wave	The upward stage	(1850–1856)	(7.6)	
		1856–1866	2.8	
		1866–1872	4.5	
	The downward stage	1872–1883	2.7	2.4
		1883–1892	3.4	2.7
The third economic long wave	The upward stage	1892–1903	4.3	2.9
		1903–1913	4.1	3.0
		1913–1920	–1.0	0.3
	The downward stage	1920–1929	5.1	3.8
		1929–1937	1.6	1.3
The fourth economic long wave	The upward stage	1937–1948	1.8	1.8
		1948–1957	5.9	4.8
		1957–1966	5.9	4.8
	The downward stage	1966–1973	5.1	4.8

Source: Van Duijn: *Economic Long Wave and Innovation*, Chinese Version, Shanghai Translation Press 1993, p. 182 Figure 9.7, p. 183 Figure 9.8, p. 177 Figure 9.5

To investigate the inner mechanism of the long wave of capitalism, first, we should briefly review several leading theories about the long wave.

There are three influential theories that explain the inner mechanism of long wave. The first is the long wave theory of technological innovation proposed by Joseph Alois Schumpeter, which states that the Investment booms driven by the emergence of a cluster of major technological innovations in a given period, and the decline of investment due to the exhaustion of the potential of technological revolution are the fundamental causes that bring about the long-term fluctuations in economy. (Schumpeter, 2000; Mensch 1979; Van Duijn, 1993) The second theory is Mandel's Marxist long wave theory, stating that the rise and the decline of the profit rate constrained by some essential economic variables are the primary factors that lead to long-term fluctuations. He also stressed that the economic factors that pushed the economy switching into the downward phase of long wave are endogenous, while the rising phase of the long wave must rely on exogenous factors (Mandel, 1983, 1993). The third theory is the long wave theory of "social structure of accumulation" proposed by David Gordon *et al.* It emphasizes that the formation and the decay of the specific institutional environment (social structure of accumulation), which are beneficial to capital accumulation, play a decisive role in long-term economic fluctuations, while the formation and the decay of the specific social structure of accumulation are endogenous economic processes. The replacement of the accumulation structure is accompanied by successive long waves, finally forming separate stages of capitalist development. This school is also deeply influenced by the traditions of Marxism (Gordon, 1998; Gordon *et al.*, 1982)[1].

It is clear that the focus of each of the three long wave theories is different. The theory of technological innovation emphasizes technical variables. Mandel's argument mainly stresses the importance of economic variables centered on profit rates, while the "social structure of accumulation" school emphasizes institutional variables. However, it can be argued that these three theories are complementary to each other rather than in opposition to each other. The direct driving force of economic growth is investment, and the rate of investment and the accumulation rate are usually the decisive factors which restrict economic growth rate. Rapid economic growth in the rising stage of the long wave is usually associated with a higher level of investment, and slow economic growth in the downward period of the long wave is usually the direct result of low investment. Therefore, the change in the growth rate of

investment or capital accumulation should be placed at the center of the long wave analysis. While emphasizing the core role of the investment rate change, it is easy to see that it is not a single factor but multiple factors that determine the long-term changes in investment rates. In the rising period of the long wave, the relatively higher investment rate and capital accumulation rate involve at least the following conditions: first, the motivation of investment. This comes from a rising trend of profit rate and the resulting optimistic profit forecasts. The purpose of capital is to pursue profits. Without the stimulation of increasing profit rates, capitalists will not invest large amounts of capital in production and management. The rising trend of profit rate needs the independent or combined impacts of the main relative economic variables, such as the increase of the rate of surplus value, the relative stagnation of the value composition of capital, the increasing velocity of turnover of capital and improvement of the conditions for the realization of the product. This is exactly the issue that Mandel is trying to analyze. Second is the material basis of investment. It comes from the new production sectors formed by technological revolution and innovation clusters, and the technical reconstruction of the traditional production departments promoted by the technological revolution. The production and construction of large-scale infrastructure and advanced production equipment are material carriers of large-scale investment. Without this material basis, large amounts of capital will not be invested, and, of course, it will be difficult to maintain a high investment growth rate for many years. Third is the institutional environment of investment. This means that some new institutional structures will be formed to promote the development of prominent economic variables so as to increase profit rates, thus guarantee the investors could hold a good and stable expectation of profit and investment enthusiasm. During the great wave of technological revolution, institutional structure conducive to capital accumulation may play a decisive role. The promotion and influence of institutional adjustment on the long wave indicate that the long wave, the capitalist economic phenomenon, is basically endogenous. Fourth is the market demand for investment. One of the basic contradictions in the process of capital accumulation is the contradiction between the capitalist production and the capitalist market, of which the essence is the contradiction between the production of surplus value and the realization of the surplus value. A higher accumulation rate requires the expansion of domestic and foreign markets so as to meet the conditions for the realization of large quantities of products produced by huge investments. If these products cannot be consumed by the market and the value cannot be realized, the capitalist cannot gain profits and maintain a relatively higher investment rate. This condition is added because even the above three theories have mentioned this point, it has not been emphasized. These are the four necessary and basic requirements for the long wave of expansion. In turn, lower investment rates and capital accumulation rates in the downward phase of the long wave result from the lack of the four basic conditions of investment power, material base of investment, favorable investment environment and the market demand. Thus, it can be seen that the intrinsic mechanism of the economic long wave is not determined by a single factor emphasized in the above three theories, but by a combination of basic factors directly related to investment in social and economic life. According to the analysis of the long wave mechanisms above, this paper will take profit rate and accumulation rate as its focus to investigate the basic characteristics of the long wave from the three major factors: technology, institution and market. In order to highlight the emphasis of this paper, we will start the discussion from the fourth long wave.

2. The fourth capitalist long wave that emerged after the Second World War

After the downward period of the long wave which was characterized by the Great Depression in the 1930s and the Second World War, a new rising period of the long wave has gradually arisen since the late 1940s. The leading countries in this long wave of expansion are the USA, Germany and Japan. The main technical basis for the long wave

of expansion in the 1950s and 1960s after the war should be the continuation and expansion of the scientific and technological revolution marked by power and internal combustion engines at the late nineteenth century and the early twentieth century. In developed countries, the leading economic sectors that promoted the rapid economic growth were automobiles, tractors, mechanized war equipment, aircraft, durable consumer goods, processing equipment, synthetic materials, petroleum, petrochemicals and the corresponding infrastructure. These may well be the leading industrial sectors in the early twentieth century when the scientific and technological revolution took place, together with the essential industries derived from that technological revolution. The institutional foundations of the long wave of expansion after the war included the following aspects. First, the major economic sectors of the developed countries are controlled by large monopolized companies. The oligopoly market structure formed by them plays a leading role in some highly concentrated sectors, and with the small and medium-sized enterprises controlled by them formed the whole economic dual structure. Second, in the main economic sectors, a relatively coordinated labor and capital system had been established, which was marked by the collective bargaining of labor and capital. This contributed to expanding consumer demand, promoting productivity growth and increasing profit rates. Third, banking was further concentrated and financial institutions became diversified. This strengthened the ability to concentrate idle money funds so as to promote capital accumulation and household consumption. Fourth, the national intervention system in the economy was unprecedentedly strengthened under the influence of Keynesianism. The economic function of the country was expanded continuously. The total effective demand of the society was adjusted, and the government attempted to “iron out” crises by means of “counter-cyclical” operation. This has contributed to the relatively stable growth of the “Golden Age” economy. Fifth, a relatively stable international economic environment dominated by the USA was formed. In addition, the development of international trade and the expansion of the world market provided an indispensable market condition for the rapid growth of the capitalist economy in the 1950s and the 1960s. Rapid capital accumulation had created a strong demand for investment. The government’s macro regulation policy and welfare system helped raise the income level of residents, significantly improving the effective demand of developed countries, and expanding the domestic market and the trade among countries. The developed countries also continued to exploit developing countries with economic means such as trade, investment and aid, and took them as a supplier of cheap energy and raw materials and also the sales market of manufactured goods. The expansion of world market presented itself in the way that the export growth of developed countries had increased rapidly and had greatly exceeded the growth rate of the economy.

The technology, institution and market conditions of the “Golden Age” formed after the war mentioned above greatly promoted strong economic growth in developed countries. During the period between 1950 and 1973, for the 16 developed countries, the average compound annual growth rate of GDP, per capita GDP, non-residential fixed capital stock and export was 4.9, 3.8, 5.5 and 8.6 percent, respectively (Maddison, 1982, p. 91, Table 4.9). However, the rules of the long-term fluctuations cannot be eliminated in capitalist economy, and various potential problems were gradually accumulated and exposed with the long wave of expansion. On the supply side, with the strong economic growth over a long period, the labor market was becoming increasingly tense, and real wages continued to increase, gradually forming a profit squeeze. At the same time, prices of raw materials also gradually increased, thus further squeezing the profits of enterprises. Two “oil crises” in the 1970s exacerbated soaring the prices of primary commodity. Thus, the rising costs weakened the accumulation of profits. On the demand side, the effective demand of the masses would not catch up with the rapid expansion of global production. The long-term rapid growth provided a large number of commodities to the world market; however, the effective demand of the society finally became relatively inadequate. The contradiction between production and consumption was gradually intensified, and the

international competition within the developed countries became increasingly fierce. Since the influence of the scientific and technological revolution was gradually weakening, the capital accumulation in developed countries was restrained by the insufficient impetus of technological change and the insufficient consumer demand, which led to the inevitable slowing down of the growth rate of investment. Global overproduction and overcapacity were finally taking shape. The utilization rate of production capacity was therefore bound to decline. At the same time, intensified competition limited the ability of capitalists to raise prices. As a result, the squeeze of profits was self-evident.

These increasingly serious economic problems reflect the re-intensification of internal contradictions in the capitalist economy, which plunged it into an unprecedented double crisis. In the 1970s, the capitalist economy entered a stage of “stagflation” and fell into a dilemma of low accumulation, low growth, high unemployment and high inflation. Take the USA, the annual average growth rate of capital accumulation fell from 7.2 percent in the 1960s to 5.6 percent in the 1970s. The annual average growth rate of GDP fell from 4.4 to 3.3 percent, the unemployment rate rose from 4.8 to 6.2 percent and the inflation rate rose from 2.4 to 7.1 percent[2]. The trend of macroeconomic indicators in other developed countries was basically the same as that in the USA. The 1970s marked the ending of the “Golden Age” of the post-war capitalism and the beginning of the crisis and economic depression. The downward phase of the long wave in the post-war economy begun.

3. Long-term fluctuations after the 1970s

For the fourth rising phase of the long wave which the capitalist countries experienced from the 1950s to the 1960s after the war, most long wave scholars seem to have no dispute, but they have disagreement on the period after that. Many left-wing scholars believe that, since the 1970s, the capitalist economy had entered a long and sustained downward phase of long wave, which lasted until the end of the last century, and even faced the occurrence of the global financial crisis in 2008. As O'Hara (2003) said, “Long wave regulation scholar tend to argue that during the 1950s and 1960s there was a long wave upswing in the USA and world economy, while the 1970s to 1990s was a period of downswing. This mode of regulation analysis is supported by the reference cycle of US gross domestic product (GDP) growth.” Since the 1960s, the average annual growth rate of real GDP per decade has indeed declined. But if we investigate the long-term changes in the major economic indicators such as the real GDP in the USA with a different way of dividing time, we will see a very different trait (Table IV).

Period	Real GDP (annual average compound rate of growth)	Gross private domestic investment (annual average compound rate of growth)	Productivity of labor (annual average compound rate of growth)	Unemployment rate (annual average unemployment rate)
1950–1973	4.2	5.7	2.8	4.8
1974–1982	2.0	0.5	0.9	7.2
1983–2007	3.4	4.7	2.3	5.8
2008–2016	1.3	0.7	1.1	7.3

Table IV.
Changes in real GDP and other major economic indicators during different periods of the post-war period in the USA

Notes: Calculation basis: the change rate of real GDP in the US: Bureau of Economic Analysis of US Department of Commerce (May 26, 2017); gross domestic product: percent change from preceding period; the rate of change in private domestic total investment: Bureau of Economic Analysis of US Department of Commerce (June 29, 2017). Table 1.1.1. Percent change from preceding period in real gross domestic product; the change rate of productivity of labor: Bureau of Labor Statistics, US Department of Labor (June 5, 2017); labor productivity (output per hour): non-farm business sector, all employed persons, percent change from previous quarter at annual rate. Unemployment rate: Bureau of Labor Statistics (February 8, 2017: employment status of the civilian noninstitutional population, 1946 to date)

From the changes happening in the main economic indicators mentioned above, we can see that after the economic boom in the 1950s and the 1960s, the economic growth of the USA did not experience a continuous downward trend, but rather a new form of long-term fluctuations. After the slowing down of the growth rate over the ten years from 1973 to 1982, the acceleration of growth rate continued from the early 1980s until 2007 when the financial crisis broke out. Since the 1980s, economic growth was accelerated in a new way. So, can it be seen as a new rising phase of the long wave? The answer is likely to be affirmative. This is because in more than 20 years (from the early 1980s to 2007), compared with the 1974–1982 depression, the main indicators of the US economy had shown a significant improvement. As the growth rate of real GDP accelerated, the growth rate of investment also increased greatly, the growth rate of labor productivity being more than doubled, and the unemployment rate dropped by 1.4 percentage points.

What is the decisive factor for the long-term fluctuations of the US economy after the war? It is the fluctuation of the rate of capital accumulation. Table V shows that capital accumulation represented by private domestic total investment is the most volatile. The rapid growth of accumulation rate drove the US economy into a new rising phase of the long wave. The sharp decline of the accumulation rate after the outbreak of the financial crisis marked the ending of the long wave of expansion. Later, the US economy once again entered the phase of long period of downswing.

Next, we will analyze the main conditions and causes of the new long wave of expansion since the 1980s by focusing on the fluctuations of the accumulation rate.

4. The major driving force for the new long wave of expansion that started from the 1980s

In the early 1980s, capital accumulation in the USA began to accelerate again. It did not happen by accident, but was the result of a series of technological, economic and institutional changes. The following factors played the major role.

4.1 Information technology revolution

Information technology is characterized by integrated circuits, computers, software, telecommunications, the internet and mobile communications. These are quite different from the post-war technology revolution dominated by automobiles, oil, aircraft, agricultural machinery, household appliances and synthetic materials in the 1950s and the 1960s. Although information technology had already been on the rise in the 1960s and the 1970s, it started to develop rapidly only in the 1980s and the 1990s when many rapidly expanding industrial sectors emerged, such as chip production, computer manufacturing, software production, telecommunications equipment manufacturing and telecommunications operations. These required large-scale infrastructure construction related to information technology, such as fiber optic networks, wireless communication base station and so on. These sectors also promoted the information technology upgrading of the entire industrial

	Non-residential fixed assets investment	Equipment investment
1974–1983	3.4	3.3
1984–1989	5.4	6.4
1990–1999	6.6	8.3
2000–2007	3.4	4.0
2008–2016	1.6	2.3

Note: Calculation basis: US Bureau of Economic Analysis (June 29, 2017) “Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product”

Table V.
Average rate
of change of
non-residential fixed
assets investment in
American economy
(1974–2016) (%)

enterprise and also influenced the service industry, offices and families. The influence of information technology revolution is profound. It has changed the organization mode and operation mode of enterprise production, changed the social and economic life of people, and formed the new “techno-economic paradigm” that is mentioned by Carlota Perez and Freeman (Perez, 2007; Freeman and Louçã, 2007a). As a material and technological foundation for the long wave of expansion, the information technology revolution has contributed much to capital accumulation and economic growth. The booming of the information industry and the transformation of information technology in traditional industrial sector have created a strong demand for investment and provided a material carrier for large-scale investment. In addition, the extensive application of computers and the rapid development of the internet have greatly increased labor productivity and accelerated the growth of economic output. Because the growth rate of productivity of the information technology core equipment (chip) sector is very high, its costs and prices have fallen sharply, thus increasing capital productivity and total factor productivity while the investment of information technology leads to the capital deepening, and helps accelerate the economy growth rate further.

4.2 Recovery of the profit rate

The changing trend of profit rate plays a decisive role in the long-term fluctuations of the capitalist economy. The empirical research of the left-wing scholars both at home and abroad has proved that the profit rate in the US economy started the rising trend since the early 1980s. Although the specific values of the long-term data in G. Duménil and D. Lévy, or in R. Brenner, or in Xie Fusheng *et al.*, differ from each other due to the different calculation methods, the data indeed show that the profit rate changing trends of the US manufacturing industry and the private economy were roughly similar. The profit rate fluctuated in a high level from 1948 to the mid-1960s, and turned to a downward trend in the middle of the 1960s, and began to decline sharply in the crisis period in 1973. After the crisis during 1980–1982, the profit rate returned to an upward trend, and then fluctuated until the financial crisis broke out in 2007 (Brenner, 2003a, p. 67, Figures 2–10; Duménil and Lévy, 2002; Xie *et al.*, 2010).

There are two direct factors that resulted in the start of the uptrend of the US profit rate in 1983. One factor is the expansion of profit share in the national revenue. The growth rate of labor productivity in the USA began to increase after the recession in the early 1980s, but the real wage of American employees was stagnant for a long time. The real income per hour of production and unsupervised employees in private non-agricultural economies (calculated in dollars in 1982) was \$8.55 in 1973 and only \$7.86 in 1999, still below the level in 1973[3]. The long-term growth of labor productivity and the stagnation or decline of real wages inevitably push up the profit share of capital. The profit share of American companies rose from 18 percent in 1973 to 21.6 percent in 1997 (Pollin, 2000). The increase of profit share is beneficial to the rise of the capital profit rate. Another factor is the increasing capital productivity. The increase in capital productivity means that the capital consumption and capital cost of unit production will be declining, and the profit rate of enterprises will also be raised.

The two direct factors that determine the rise of profit rate involve two basic concepts of Marxist economics: the rate of surplus value and the organic composition of capital. The profit share is only another measuring method of the rate of surplus value, and the capital productivity usually correlates negatively to the technical composition of capital. Because the change of the capital-output ratio (the reciprocal of capital productivity), under the condition of constant labor productivity, is in direct proportion to the change of the capital-labor ratio. Marx regards the rate of surplus value and the organic composition of capital as essential variables in determining the profit rate. In a depression period of low-profit rates, the primary

means of boosting profit rates to stimulate investment and growth is to try to increase the rate of surplus value and reduce the organic composition of capital. This is exactly what the US economy experienced in the 1980s and 1990s of the last century: it fundamentally changed the rising trend of worker's real wages in the post-war period, and, at the same time, restored the sluggish growth rate of productivity in the 1970s, while the capital accumulation dominated by information technology constrained the increase in the organic composition of capital. Both of these brought out a gradual rise in American profit rates. According to Roberts' (2016c) calculation, in the period from 1982 to 2002, the rate of surplus value in the US economy increased by 22.5 percent, the organic composition of capital fell by 5.2 percent and the profit rate increased by 29.9 percent (Figure 4.2).

The recovery of profit rates in US economy from 1983 had a strong institutional background. Since the 1970s, driven by tough economic situation such as declining of the profit rates and slowing down of the growth rate, the US economic relationship has undergone a profound adjustment process, and created a favorable economic environment and institutional basis for re-increasing profit rates and investment rates. There are three particular important aspects:

- (1) The relationship between labor and capital: the most profound change in the labor and capital system in developed countries after the 1970s is that the relatively coordinative and mutual beneficial labor relation formed in the post-war period gradually became tense and against the workers. Since the US economy was in trouble in the 1970s, the management level of large companies began to take a strong offensive strategy towards workers. The rise of economic globalization and the US Government's neoliberalism economic policy contributed to the transformation of capital strategy. The federal minimum wage level had been frozen in a rather long period for several times. The large-scale relocation of labor-intensive production reversed the supply and demand situation in labor market, which made the workers lose the ability to bargain with capital. The "trade union density" (the proportion of workers in the union) continued to decline, and the trade union was increasingly defensive under the capital's offensive strategy, so that concessions should be made in terms of wages and benefits. The "flexible" work system was widely adopted that made a large number of involuntary part-time workers suffer from low wages, low welfare and lack of occupational security. All these institutional changes have contributed to the stagnation of real wages and the rise in exploitation rates since the 1970s.
- (2) The financial system: the American financial system has gradually developed towards liberalization since the 1980s. The financial regulation gradually relieved. The "Glass Steagall Act" appeared to be weakened and was finally abolished in 1999. Commercial and investment banks' operation tended mixed. This change in the financial system expanded the scale of banks, and intensified the competition in the financial sector, improved the allocation efficiency of financial resources to a certain extent and was conducive to the capital accumulation and the growth of investment. At the same time, under the impetus of American financial liberalization, financial innovation emerged continuously, especially the rise of venture capital is of great importance. The combination of venture capital and the growth enterprise market has helped create a large number of small high-tech companies, largely promoted the development of information technology. In addition, the direction of US financial policy changed after 1980 and began to take the inflation control as the priority. Interest rates declined with the decrease of the inflation rate. The financial environment of low inflation and low interest rates also strongly stimulated investment growth.

- (3) The market structure: in the last 30 years of the twentieth century, the market structure of the USA had undergone new changes. After the neoliberalism prevailed once again, the anti-trust policy tended to ease, and governments increasingly deregulated markets. The use of information technology reduced the average size of enterprises, strengthened the competitiveness of small enterprises and improved the market competitiveness of the general industries. However, while the general industry turned to competitive market structure, the high-tech sector strengthened the monopolistic trend of internationalization. In the last 20 years of the twentieth century, mega-merger and cross-border acquisition further reinforced this trend. The dual evolution of American market structure reflected the structural adjustment of the American economy after the 1970s: the high-tech sector was growing, and the production and labor services of low technology and labor-intensive transferred out of the USA, and the service industry developed rapidly. This market structure was very favorable to the US economy at that time. The monopolistic high-tech enterprises remained dominant in the key sectors of the world economy and gained high profits. The increasingly competitive nature of general sectors temporarily promoted economic prosperity and increased the import of cheap commodities, thus helping to maintain relatively low rate of unemployment and inflation in the USA.

4.3 The expansion of the world market

The focus is on economic globalization. Although the globalization of capitalism has already begun for a long time, the process has changed in terms of quantity and quality after the 1970s. International flows of goods (services) and production factors increased significantly, and most foreign trade was dominated by multinational corporations. International capital flows have expanded rapidly, and the globalization of money flows has dramatically increased. The worldwide foreign exchange trading volumes, the stock of transnational bank loans and the cross-border transactions of bonds and stocks were all on the increase. Financial globalization has become the most prominent feature of the new economic globalization since the 1970s. The rapid development of economic globalization in this period reflects the significant institutional changes of international economic relations. First, the transnational operation system of enterprises has developed unprecedentedly, and the global allocation of production resources has been realized. Developed countries have transferred a large number of labor-intensive production enterprises and production procedures to developing countries or regions of low wages. Second, the international financial system changed much. Under the neoliberalism policy, the government relieved the regulation of capital accounts and the financial industry, and removed the institutional obstacles to the international flows of currency capital. The collapse of the Bretton Woods System in the early 1970s opened up the era of the floating exchange rate system, and promoted the international currency flow further. The foreign exchange trading then grew rapidly. Since then, US\$ have eliminated the limitations of gold. It made it easier for the USA to use monetary instruments to serve its economic interests and strengthen the international hegemony of the dollar.

The expansion of world market caused by economic globalization is crucial to this long wave expansion in the USA. First, economic globalization has provided favorable production conditions and broad foreign markets for high-tech companies which emerged during the information technology revolution in the USA. The US imports and exports have expanded rapidly, far exceeding the growth rate of GDP. During the period from 1983 to 2007, the average annual growth rate of GDP in the USA increased by 3.4 percent, while the average annual growth rate of exports reached 6.5 percent, and the average annual growth rate of imports reached 7.8 percent[4]. The expansion of the world market has provided huge

demand for information technology products and has promoted the rapid development of information technology companies in the USA. In 1996, among the world's largest 20 information technology companies, 13 were American companies. The expansion of the world market has also created the conditions for global allocation of resources for the US high-tech industries so as to reduce costs and increase profits. The international division of high technology industry developed from an inter-industry division, intra-industry division to intra-product division, and has formed a global industrial chain. Second, economic globalization has helped to keep a relatively low inflation rate in the USA. A large number of low-end manufacturing industries have been transferred to developing countries and the products are then returned to the USA with a lower price. The developed countries' traditional trading mode of importing primary products and exporting industrial products has evolved into a trading model, where developed countries like America export new and high-tech products while developing countries export general industrial and primary products. Third, economic globalization has also strengthened the financial hegemonic status of the US\$. Under the tide of economic globalization, the American international trade deficit continues to expanding. The USA maintained the payment imbalance by just relying on the hegemonic status of the US\$. It imported a significant amount of goods abroad by issuing the US\$, which is not restricted by gold, and took back the dollars that flow abroad through the international financial market, in order to balance the international payment of deficit caused by large imports. This mode of international trade enabled the USA to exchange dollars for a large number of cheap goods from other countries and got a huge amount of low-cost financial capital from abroad.

5. The inevitability of the transformation from the long wave of expansion to the long wave downswing

The financial-economic crisis that occurred in 2008 formed the turning point of the long wave; from then started the downward phase of the long wave. The inevitability of the transformation means that various factors which are beneficial to a long wave of expansion gradually changed to the direction which is not conducive to accumulation.

First, the impact of the information technology revolution on investment is waning. The investment driven by information technology revolution was most powerful in the 1980s and the 1990s. However, after a period of rapid capital accumulation, the driving effect and related investment demands of information technology inevitably declined with the spread and updating of computers and related equipment, as well as the improvement of internet infrastructure. A series of economic indicators shows that the IT revolution's positive impacts on the American economy have gradually weakened since the beginning of the new millennium, especially around 2005. It first reflects on the change of the investment rate. The sharp decrease of US investment rate after the beginning of the new millennium reflects that the accumulative effects of information technology revolution are diminishing.

In addition, in terms of growth rate of labor productivity, the average annual growth rate was 1.44 percent in 1977–1994, 2.05 percent in 1995–2004 and 1.3 percent in 2005–2014. Regarding the growth rate of total factor productivity, the average annual growth rate was 0.57 percent in 1970–1994, 1.03 percent in 1994–2004 and 0.4 percent in 2004–2014 (Gordon, 2016a).

It should be pointed out that the leading role of the information technology revolution in investment and economic growth is far less powerful than the technological revolution based on electricity and internal combustion engines at the turn of the twentieth century. Robert J. Gordon stressed: the “Great Inventions” of the Second Industrial Revolution utterly changed living and working conditions, particularly in urban America, within half a century and their full impact was largely complete during the century following 1870 (Gordon, 2012). The second industrial revolution not only revolutionized industrial production, but also modernized social life. It promoted large scale of infrastructure construction of social

production and life. It also created longer term and large scale of investment demands. The information revolution cannot be compared with the second industrial revolution in this respect.

Second, the rising trend of Profit rate is reversed. From the early 1980s, the profit rate of American economy tended to rise, which opened a new stage of the long wave of expansion. However, the rising trend of profit rate began to decline in the late 1990s. According to Roberts' (2016b) calculation, the profit rate of the economy increased by 15 percent from 1982 to 1997, and dropped by 12 percent from 1997 to 2008. The reversal of the profit rate increasing trend would inevitably cause the slowdown of capital accumulation and economic growth, preparing the conditions for the outbreak of economic crisis and the downturn of the economic long wave. Why did the slowdown of profit rate of the American economy happen in the late 1990s? The inherent causes can be analyzed on the basis of several key factors that influence the profit rate.

The first factor is the profit share. The primary factor driving the recovery of the profit rate was the gradual increasing of profit share from the early 1980s, which was the result of the real wages of workers lagged behind labor productivity for a long time. In the mid-1990s, the unemployment rate fell because of continuous economic growth. This triggered the slow rise of real wages since 1996. During the period from 1995 to 2007, the real hourly earnings and real weekly earnings rose by 10.4 and 8.8 percent, respectively. However, the increase in real wages did not squeeze the profit share due to the rapid growth of productivity driven by the information revolution. During the period from 1996 to 2003, the average annual productivity growth rate of non-farm business sector reached 3.1 percent, much higher than the rate of 1.6 percent from 1984 to 1995. Labor productivity increased by 38 percent during the period from 1995 to 2007[5].

This shows that the decline of the profit rate in the late 1990s was not mainly caused by the shrinking profit share and the decrease of the rate of surplus value. Actually, the intensity of exploitation of workers was not relieved during the entire period of the long wave of expansion. From 1984 to 2007, the real GDP rose by 101 percent, and the productivity of non-farm business sector grew by 64 percent. But the real wages of worker were basically in stagnation with a 4.5 percent increase in average hourly earnings and a 0.7 percent increase in average weekly earnings, none of which reached the level of 1973[6]. The benefits of economic growth were mainly obtained by the few richest people. The increasingly serious social economic inequality and the stagnant earnings of general public were bound to cause insufficient effective demand, thereby aggravating the contradiction between production and consumption. The overproduction is directly reflected in the under-utilization of production equipment. Statistical data show that the capacity utilization rate of the US industry peaked in 1997 and then declined. Capacity utilization rate of all industries grew from 73.6 percent in 1982 to 84.2 percent in 1997, decreased to 74.9 percent in 2002 and returned to 80.4 percent in 2007. However, this rate is significantly lower than that of 1997. It dropped to 68.6 percent in 2009 after the crisis broke out. If we observe the annual average rate of capacity utilization over a longer period of time, it was 82 percent in 1984–1997, and decreased to 79.1 percent in 1998–2007[7]. Therefore, it was the insufficient social demands and low capacity utilization rate that caused the decrease of profit ratio after 1997.

The second factor is the organic composition of capital. The long wave of expansion based on information technology revolution will certainly increase the technical composition of capital because of a rapid increase in the investment of information equipment. However, the increase of the value composition of capital will slow down and even decline due to the quick depreciation of information technology equipment. This favorable technical condition for profit rate changes with the diminishing role of information technology revolution. An important indicator of the information technology equipment depreciation is the ratio of price to performance. The 1996–2000 interval witnessed the most rapid rate of decline in

performance-adjusted prices of ICT equipment. The rate of decline of the ICT equipment deflator peaked at -14 percent in 1999 but then steadily diminished to barely -1 percent in 2010–2014. Moore's law also changed. Although the time for the double the efficiency of the chip during 1999–2003 has been reduced to less than 18 months, since 2006, Moore's law has gone off the rails: The time to double chip efficiency increased dramatically. It soared to eight years in 2009 and then declined gradually to four years in 2014. The change in "Moore's Law" is closely related to the ratio change of Price-to-Performance for computer equipment (Gordon, 2016d). The changes in the above economic indicators suggest that the factors conducive to curbing the rise in the organic composition of capital during the climax of the information technology revolution gradually began to disappear around 2005. As a result, the reduction of capital productivity and the increase of organic composition of capital were inevitable. In addition, capacity utilization rate decline caused by insufficient effective social demand was also an important factor to push up the organic composition of capital after 1997. As the capacity utilization rate decreases, the relatively enlarged amount of idle fixed capital still should be counted into the total capital stock. This is precisely the mechanism that the profit rates decline due to the insufficient effective demand and the exacerbation of realization problems. According to Roberts' (2016c) calculation, the organic composition of capital in the US economy declined by 5.2 percent from 1982 to 2002 but increased by 41.3 percent from 2002 to 2011.

Another important factor influencing the change trend of profit rate involves the rapidly expanding debt economy in the financialization of economy. The interest rate in the US economy shifted toward long-term decline after a sharp rise from 1979 to 1981. According to the interest change trajectory of USA three-month treasury bond, Shaikh (2014) figured out two phases of interest rate change trends of the post-war period: the first phase was from 1947 to 1981, when the interest rate rose from 0.59 to 14.03 percent; the second phase began in 1981, with the interest rate dropping from 14.03 to 0.16 percent in 2009. Low interest rates have contributed directly to the expansion of borrowing and the boom of stock market. It also formed financial bubbles twice in the late 1990s and in the first seven years of the new century. The interaction between financial bubbles and debt inflation expanded total demands during certain period of the long wave of expansion, ensuring market conditions for profit rate increase. It also reflected the weakness of the basis of this economic expansion and intensified the inherent contradictions gradually, and eventually led to the decrease of the profit rate and the break-out of structural crisis. The first stock market bubble occurred in the second half of 1990; it was a financial bubble formed on the basis of IT technological revolution such as personal computer and the internet. There was a rare stock market boom in the US history. The easy financial environment encouraged unscrupulous financial manipulation by non-financial companies and led to an unprecedented expansion of corporate debt. Meanwhile, the household debt has risen sharply. The wealth effect of the extraordinary stock market boom has led to a rapid expansion of household borrowing. Developing the debt economy through financialization has become a major means for the USA to expand its domestic market by increasing household consumption in the context of wage stagnation. But the frenetic debt economy also carries a hidden curse: the collapse of the stock market bubble could trigger a financial and economic crisis. The bursting of the IT bubble in the late 1990s was the first indication of the above-mentioned process during this period. Interest rates rose to the highest level since 1991 in 2000, and prompted a cyclical crisis in the first quarter of 2001.

However, this crisis was relatively moderate, and the USA did not learn from it. After the bursting of the information technology bubble in 2001, the real estate bubble began to expand and debt consumption was fueled again. Financial institutions enforced the implementation of the financialization of personal income, especially housing financialization, including offering subprime mortgages for poorer people. Low-interest

rate policies and securitization of financial sector have greatly encouraged this trend, and formed an increasingly inflated property bubble rapidly. This not only stimulated the housing consumption, but also ensured the debt consumption, and led to a decrease in saving rate and a sharp increase in debt due to the wealth effect of continuously rising housing prices. As a result, the bursting of the bubble at the beginning of the twenty-first century was finally repeated. The credit crunch of the monetary authorities in 2006 and 2007 immediately triggered the “subprime mortgage” crisis, leading to the great crisis of 2008–2009. This crisis was no longer the moderate periodical crisis as in 2001, but a combination of periodical and structural crisis, which was an eruption of deep contradictions accumulated throughout the long wave of expansion. And it became the turning point from the long wave of expansion to a long wave downswing.

Third, the world market influenced by economic globalization is also changing. The economic globalization has indeed brought multiple benefits to the USA at first, and provided favorable production and market conditions for the acceleration of capital accumulation and economic growth. However, the capitalist economy always contains unsolvable inner inherent contradictions. Its temporary advantages will become disadvantages over time, and will gradually cause various unfavorable consequences. The most important of these was the hollowing out of the American manufacturing, which weakened the international competitiveness of the American industry. The USA has obtained high profits from investment and trade in developing countries with the help of economic globalization and industrial transfer, however, which, in turn, cultivated a number of new competitors, especially emerging economies such as China, in addition to the former rivals such as Japan and Germany. Through technology introduction, product quality improvement and added value increase in their products, these emerging economies not only squeezed imports from developed countries such as the USA, but also expanded their market shares in the USA. Although the USA’s economic performance was strong in the second half of the 1990s, it was unable to change the downtrend of its international industrial competitiveness and its share in the world market. The potential market contradictions became fierce again, and squeezed the profit rate by the difficulties of value realization. This was also reflected in the changes of American import and export situation. During the period from 1995 to 2007, the average annual growth rate of import goods was 8.4 percent, which is basically equal to that of 8.3 percent from 1985 to 1995. However, the average annual growth rate of exports dramatically decreased from 10.3 percent of the prior period to 5.9 percent[8]. The relative shrink of foreign market share would inevitably worsen the realization conditions of the US economy, and it was an important reason why the great crisis of 2008 broke out and began to turn into a long wave of depression.

6. Further discussion on this long wave of expansion

Academia offers different opinions on whether this long wave of expansion exists in developed countries. Some left-wing scholars deny the existence of this long wave of expansion. They believe that the long depression since the 1970s has continued till now, during which there was a period of rapid productivity growth, especially the prosperities in 1990s may just be a short periodic expansion mainly. It did not change the basic situation of the long wave of depression fundamentally (O’Hara, 2003). Such views are open to discussion, especially the two “arguments” that negate the long wave of expansion.

First, some scholars believe that there was no institutional environment for the long wave of expansion after the 1980s. They put the liberalization and globalization of economy and the formation of a new social structure of accumulation in opposition, and asserted that economic globalization intensifies international competition, and it weakens the ability of the nation state to intervene and regulate the economy independently. Countries without self-regulation can hardly form a new social structure of accumulation, let alone the long

wave of expansion (Kotz, 2003). I think this point of view is too absolute. In the context of economic globalization, it is an objective fact that the increasingly fierce international competition has restricted the ability of the nation state to regulate itself to some extent, as well as the rise of neoliberalism in the USA, the UK and other countries after the 1980s. But it should be noted that with the serious contradictions between production socialization and capitalism, the economic regulation of government is necessary. The regulation degree depends on the needs of large capital and the changes of the real economic situation. Not only has the globalization and liberalization of economy not impeded the establishment of the new social structure of accumulations, but also it has reflected the adjustment of domestic and international economic system itself, becoming the basic components of the new social structure of accumulation.

Some scholars believe that a long wave upswing of the US economy is unlikely to be in operation because the neoliberal mode of regulation is highly contradictory. The regime of accumulation is full of active conflicts and instabilities. It is likely that an adequate regime of accumulation has not yet emerged (O'Hara, 2003). In fact, the nature of capital determines that any institutional structure of capital accumulation contains contradictions, and the difference is the depth and the expression form of the contradictions. In the view of some leftists, if an institutional relationship leads to the decline in the real wages of worker, the widening of social inequality and the reduction of general social welfare, it seems unlikely to promote economic growth and form the long wave of expansion. Part of the reason why radical political economists have misread the expansion seems to be their choice of questionable criteria for economic recovery and expansion – a problem which perhaps can be called “moralization of capitalism.” They seem to conflate issues of productivity, efficiency and economic growth with those of equity, income distribution, and prosperity for all (Hossein-Zadeh and Gabb, 2000). By analyzing this long-wave of expansion that started from the 1980s, we can find that the institutional adjustment which leads to the stagnancy and decline of employee wages is the significant conditions for rebound in profit rate. The financialization, stock market prosperity, wealth effect and debt inflation have also promoted investment, consumption and economic expansion at a certain period. There is no denying that the neoliberal institutional structure contains profound contradictions and vulnerabilities (to be discussed later), but we must analyze it dialectically; we cannot deny its real role in boosting economic growth for a certain period of time, as it may become the institutional condition for a new long wave of expansion.

Second, some left-wing scholars believe that we cannot assert a worldwide long wave of expansion that has emerged only taking the relative prosperity of USA after 1980s as the evidence because some developed countries such as Japan are still in stagnation in the meantime. In this regard, we think that the long wave, an international phenomenon of the capitalist economy, has performed most prominently in the dominant countries historically. The economic aggregate fluctuation of non-dominant countries may be inconsistent with that of dominant countries due to historical and practical reasons. For example, during the second downward period of the long wave that from the 1870s to the 1890s, as the dominant country, the economic growth rate declined obviously in UK, but it was not the same in the USA. And during the third rising period of the long wave that from the 1890s to the 1920s, the economic growth rate of the USA, which is the dominant country, increased significantly, but the UK did not show any sign of the rise of the growth rate. The situation is the same during the long wave of expansion that started from the 1980s. Table VI shows the average annual growth rate of Group of Seven (G7) and OECD countries in several post-war periods.

Table VI shows that during the long wave of expansion from 1983 to 2007, the growth rates of the USA and the UK rose most significantly, while the growth rates of Japan, France and Italy actually slowed down. However, this is not a reason to deny this long wave of expansion. Because not only did the GDP of USA and UK account for over 50 percent

of G7's GDP, but the overall growth rate of OECD countries also increased. More importantly, the technological foundation, institutional foundation and market foundation of all advanced capitalist countries have undergone major structural adjustments during this period. This is the fundamental basis for judging whether the long wave of expansion emerges. Freeman and Louçã once pointed out that some economists take the rapid growth of the US economy after the Civil War of 1861–1865 as the evidence for no decrease at the end of second Kondratieff's long wave and no increase from 1895 to 1913. This view based on the general trend of GDP ignores the adjustment and the structural crisis that the USA experienced in the 1870s, 1880s and the early 1890s, when some Western European countries also experienced similar crises (Freeman and Louçã, 2007b). In the 1970s, there was also a structural crisis in other major capitalist countries like the USA that experienced significant structural adjustments from the 1980s to the 1990s. The sharp decline in profit rates was a central feature of the 1970s structural crisis. Compared with the period from 1952 to 1973 and from 1974 to 1981, the average annual net profit rate in manufacturing industry decreased from 19.5 to 10.4 percent in all capitalist countries except the USA[9]. It is the drop in the profit rate that caused the sharp decrease in capital accumulation rate and economic growth rate.

The decline in profit rate and capital accumulation rate was the inevitable result of the serious structural imbalance in the advanced capitalist countries. The period from the 1980s to the 1990s witnessed structural adjustment in this regard. In terms of technology, all advanced capitalist countries experienced the information technology revolution that began in the USA. In terms of the institutional environment, neoliberalism, replacing Keynesianism, was adopted by developed countries in different degrees, which introduced systems and policies conducive to big capital, as well as promoted privatization, liberalization and financialization. Regarding market conditions, all developed countries were involved in economic globalization. These profound structural adjustments formed the technology, institution and market foundation of the long wave of expansion from the early 1980s to 2007. The growth rate of several developed countries did not accelerate during the period of the long wave of expansion, which, however, cannot be taken as the evidence for negating this capitalism long wave of expansion due to the historical background and special reasons of related countries.

7. Principal features of this long wave downswing

The global financial and economic crisis from 2008 to 2009 was the turning point of the fifth long wave of expansion. The advanced capitalist countries thus entered a long wave downswing featured by slow accumulation.

The particularity of the long wave of expansion must be understood in order to judge and observe this long wave downswing. Compare with the long wave of expansion of the Golden Age during the post-war period, the most significant difference of the long wave of

Table VI.
Compound annual
growth rate (%) of G7
and OECD countries
in several periods

	USA	UK	Canada	France	Germany	Italy	Japan	OECD countries
1961–1973	4.4	3.4	4.9	5.7		5.3	9.4	5.2
1974–1982	2.0	0.9	2.7	2.6		2.9	3.5	2.4
1983–2007	3.4	2.9	2.9	2.2	1.5 ^a	1.9	2.4	3.0
2008–2016	1.3	1.0	1.5	0.5	1.0	–0.8	0.4	1.2

Notes: Calculation basis: OECD Economic Outlook: Statistics and Projections (2017), available at: <https://data.oecd.org/gdp/real-gdp-forecast.htm#indicator-chart>. ^aRefers to the compound annual growth rate from 1992 to 2007 because data of Germany were counted since unification

expansion that began in the 1980s is that it occurred in the context of global excess capital and overcapacity. The long wave of expansion from 1894 to 1929 has also caused serious overcapacity. But a large amount of excess capital was discarded, depreciated or directly destroyed during The Great Depression in the 1930s and the Second World War. Therefore, when the long wave of expansion emerged in the 1950s and 1960s, there was not serious overproduction. On the contrary, the social consumption demand postponed by the world war, the large-scale post-war economic reconstruction, the expansionary economic policies by Keynesian and the long-term growth of real wages for workers all provided favorable market conditions for the strong economic growth of capitalist countries during the Golden Age. But the long wave of expansion since the early 1980s was different from this. The unprecedented rapid economic development in the “Golden Age” expansion stage will eventually surpass the growth of social demand and cause severe overproduction. This sign appeared in the late 1960s. With the rapid development of West Germany and Japan, the trade competition among the developed capitalist countries had become increasingly fierce. The insufficient effective demand, with the increase in both labor costs and capital costs driven by long-term over-accumulation, will inevitably squeeze the profit. The average rate of yields of G7 countries had fallen by 25 percent from 1965 to 1973 (Brenner, 2003b). The oil crisis of the 1970s further aggravated the capitalist economic crisis and turned the post-war long wave of expansion to the period of depression. But the long wave downswing was very short, and did not destroy excess capital as it did during the Great Depression in the 1930s and the Second World War. Instead, it transformed into a new long wave of expansion in the early 1980s. Therefore, this new long wave of expansion occurred in the context of overcapacity globally.

At the first glance, there seems to be a paradox. How can new long waves of expansion emerge in the global context of excess capacity? In fact, the market problem is, of course, the fundamental problem in the development of capitalism. Theoretically, capital surplus generally leads to crisis and stagnation. However, under the conditions of major technological revolution and institutional reform, it is possible to be partly overcome in a certain period. The appearance of a new long wave of expansion is possible. Every occurrence of a long wave of expansion is the result of structural crisis and major structural transformations based on the combination of scientific and technological revolutions and institutional adjustments in the capitalist economy. It was the information technology revolution that began in the 1980s, the neoliberalism-oriented institutional adjustment and the economic globalization that promoted this major structural transformation in the capitalist countries and drove it into a new rising phase of the long wave. It also should be noted that the above-mentioned special economic background made the long wave of expansion not robust enough. It is mainly reflected in two aspects. First, this long wave of expansion was not as robust as that of the Golden Age. The relatively rapid economic growth mainly occurred in dominant countries, such as the USA. Even in the USA, the major economic indicators including GDP growth were lower than that of the previous long wave of expansion in the 1950s and 1960s (see Table V). In addition, the major structural adjustments that had driven the economic growth acceleration of the USA, Britain and other major countries in this long wave of expansion indeed contained profound contradictions and vulnerabilities. Although the information technology revolution promoted the capital accumulation and the economic growth, as a technological basis, it was much weaker than that of the previous two long waves of expansion. At the same time, in the context of overcapacity, big capital had to implement neoliberalism-oriented institutional adjustment with the help of the government in order to advance capital accumulation by regaining profit growth. It was mainly featured by exploitation rate growth and financialization popularity. And this kind of technical and institutional evolution contains potential risks of new structural contradictions and crises.

The long wave of expansion and its features determine that the financial-economic crisis of 2008–2009 is not a simple periodic economic crisis or a general financial crisis, but a great structural crisis that formed a turning point of long wave and opened a long wave downswing. Some western left-wing scholars distinguish it from periodic recession or crisis by calling it “The Great Recession.” First, the duration of this crisis was the longest compared with other twelve crises after the 1929–1933 crisis. It lasted for 18 months, which almost doubled the average length of the previous 12 recessions (10 months) (Roberts, 2016a, Table 1-1). Second, the depth of the crisis has also been rarely seen since the Great Depression of the 1930s. Its economic decline degree has exceeded all previous crises after the war. In 2009, the US GDP decreased by 2.8 percent, which is even higher than –1.9 percent in 1982 of severe recession[10]. Third, the depth of the crisis was also reflected in the significant drop in investment. In 2009, the gross private domestic investment sharply decreased by 21.6, which is extremely rare in the recessions during post-war periods. Residential investment declined by over 20 percent from 2008 to 2009 for two consecutive years. Non-residential fixed assets investment declined by 15.6 percent in 2009, which set a post-war record of this indicator[11]. Fourth, even “The Great Recession” began in the USA, but it rapidly spread to all the other capitalist countries. All of the global capitalist economies are involved in the worst crisis since the 1930s. For the developed countries of OECD, the overall GDP declined by six percentage points from the peak point in 2007 to the trough in 2009, industrial production reduced by 13 percent, the world trade declined by 20 percent and world stock market fell by 50 percent on average (Roberts, 2016d). This was certainly a great crisis and recession.

More importantly, the USA and the rest of the capitalist countries did not enjoy a period of prosperity after “The Great Recession,” but entered the stage of relative stagnation—“The Long Depression.” It clearly shows that “The Great Recession”, indeed as a turning point, led to a downward phase of this economic long wave. This can be observed from the following aspects. First, the US economy began to recover from the recession in the second half of 2009. The economic boom that should have occurred during the expansion period has not emerged yet. The average annual growth rate of GDP for the seven years from 2010 to 2016 was only 2.1 percent (2.08 percent), which was the most sluggish recovery of all the post-war recoveries. It is significantly lower than the 2.7 percent during the expansion phase of the cycle that from 2002 to 2007, 3.8 percent of 1992–2000 and 4.4 percent of 1983–1989[12]. The recovery in other major capitalist countries was even worse. The average annual economic growth rates for 2010–2016 were as follows: 2.0 percent in Germany, 2.0 percent in the UK, 1.4 percent in Japan, 1.1 percent in France and –0.1 percent in Italy[13]. This situation had never occurred after all previous post-war crises. Second, the transition from a periodic recovery to prosperity is mainly driven by investment. But there has been no sustained increase in investment after “The Great Recession.” The crisis of 2009 witnessed the rare capital accumulation collapse since “The Great Depression” with a 21.6 percent sharp decrease in gross private domestic investment and a 15.6 percent sharp decline in non-residential fixed assets investment. After such a serious accumulation crisis, the economic recovery should have witnessed the sharp rebound and acceleration in the investment rate that would drive new periodic growth. However, except for a slightly higher accumulation rate in 2010 and 2012, the investment in other years was relatively weak and tended to decline. In 2016, it even fell into negative growth. During the whole “recovery” lasting from 2010 to 2016, the average annual growth of gross private domestic investment in the USA was 6.1 percent. However, the growth rate was only 3.5 percent from 2013 to 2016. The growth rate of non-residential fixed assets investment was even worse, with 4.3 percent from 2010 to 2016 and only 2.8 percent from 2013 to 2016[14]. It is the weakness of capital accumulation that determines the current situation of depression in economy in the USA. The investment in other developed countries was also stagnant. Third, the sluggish nature of the US economy was also reflected by a marked decline in productivity growth.

During the “recovery” stage after “The Great Recession,” the growth rate of labor productivity was unprecedentedly low since the Second World War. In the seven years from 2010 to 2016, the annual growth rate of the labor productivity had never exceeded 1 percent except for the 3.3 percent increase in 2010. The average annual growth rate in these seven years was only 0.9 percent, which was significantly lower than 2.6 percent during the periodic expansion from 2002 to 2007, 2.2 percent from 1992 to 2000 and 2.0 percent from 1983 to 1989. It was even 0.7 percentage points lower than 1.6 percent, the average annual growth rate during the upward phase in the cycle of 1970s (1976 to 1979) when the economy was in depression[15]. The unprecedented low rate of labor productivity growth was a prominent feature of this “Long Depression.” Fourth, the unemployment rate during the recovery was also higher than that of all previous post-war periodic recoveries. The average unemployment rate from 2010 to 2016 was 7.2 percent, which was remarkably higher than the 5.3 percent from 2002 to 2007 and 5.5 percent from 1992 to 2000. It is even higher than the 6.8 percent from 1983 to 1989 and 6.7 percent from 1976 to 1979[16]. The primary reason that cause the high average annual unemployment rate during this recovery is the unprecedented surge of unemployment during the Great Recession. The percentage fall in US employment was 6.3 percent from the peak to the trough, which was nearly one and a half times higher than the average percentage fall (2.6 percent) during the six recessions from 1957 to 2001 (Roberts, 2016d). The unemployment rate soared from 4.6 percent in 2007 to 9.3 percent in 2009. Another reason is that the employment increased slowly during the first few years after entering the recovery phase. By 2013, it had not yet returned to the pre-crisis level in 2007, and the unemployment rate had remained high. It was not until 2014 that the employment growth gradually accelerated. The unemployment rate began to decline significantly, which reached 4.9 percent in 2016[17]. The other factor that could not to be neglected for the unemployment rate decline is the decrease in the labor-force participation rate, which has dropped from 66.0 percent in 2007 to 62.8 percent in 2016[18]. The dropping out of a large number of laborers from the labor market contributed to lowering the unemployment rate. The lower unemployment rate also covered up massive underemployment. Many employees who wish to do full-time jobs can only do part-time jobs.

8. Prospect

Many scholars call the downward phase of the long wave from the Great Recession in the capitalist world as “The Long Depression.” Its formation is no accidental. The fifth section of this paper made concrete analysis regarding the causes. Generally speaking, it was the inevitable outcome of the acute structural contradictions accumulated during the long wave of expansion. In terms of technology-based structural contradictions, the positive effect on the economy from the Third Industrial Revolution centering on information technology has declined, while the climax for the new technological revolution is yet coming. The whole society lacks the technological impetus to drive rapid productivity and investment growth. From the perspective of institution-based structural contradictions, the major active role played by neoliberalism on capital accumulation has turned to be negative. The new institution structure in favor of capital accumulation is still not available and the deep-rooted economic imbalances remain unresolved, delaying the recovery of profit rate and investment rate. In terms of market-based structural contradictions, the global market development effect of the economic globalization has transformed into a more serious worldwide overproduction. The new market development is confronted with strong political and social resistance. In this case, the severe deficiency of effective demand remains unresolved, failing to create market conditions for accumulation and more rapid economic growth. Therefore, whether the capitalist countries could get out of the “long depression” and start a new long wave of expansion depend on the time and extent of these three elementary structural contradictions could be solved, and really realize the deep structural

adjustment and transformation. It has been ten years since the break-out of the capitalist financial-economic crisis in 2007, and eight years for economic recovery since the second half of 2009. How about the resolution of the structural contradictions of capitalism?

At this moment, there is no sign indicating that the technical base for a new long wave of expansion takes shape regarding scientific and technological revolution. It is undeniable that the current pace of technological progress is very rapid. The Fourth Industrial Revolution centered on artificial intelligence has begun to come into being. New technologies are emerging, such as 3D printing, robotics, Big Data, cloud computing, clean energy, driverless vehicle and artificial intelligence. Many people are optimistic about the prospects of the science and technology revolution as well as its economic effect. But Robert Gordon threw a wet blanket over it. Some of his ideas are worth pondering. First of all, he distinguished between the pace of innovation and the impact of innovation on the growth rates of labor productivity and TFP. He underlined that there is no controversy over the frenetic development in innovation activities, especially in digital technologies, including robotics and artificial intelligence. However, the standard scale to measure the influence on the economy by innovation and technological changes should be productivity growth. Evaluate by this standard, even the current American innovation activities are extremely active, but they exert a very weak influence on productivity. Annual growth rate in total factor productivity from 2004 to 2014 was merely 0.4 percent (Gordon, 2016b). Why cannot vigorous innovation translate into productivity growth? Gordon talks a little about the reasons, but it seems worth delving into further. Second, as Gordon also pointed out, historically, there exists a long delay from the time when great inventions of industrial revolution emerge to the point when they exert strong economic implications. For instance, electricity and the combustion engine, as two core inventions during the second industrial revolution, both emerged between 1870 and 1900. But it was not until the 1910s that they were widely applied in industry. It was only in the 1920s that they had a tremendous influence on productivity growth. The same story goes with the Third Industrial Revolution. Although large computers were used by some big companies in the 1960s and personal computers popularized in 1980s, its strong driving force on productivity mainly happened from 1994 to 2004 (Gordon, 2016c). In this sense, it will still take time to have significant effect on productivity and economic growth, even though major inventions of the Fourth Industrial Revolution have already appeared. It is also hard to predict how much this technological revolution will boost productivity growth.

A new institutional basis in favor of capital accumulation has not yet come into being regarding institutional structures. What the USA and other major capitalist countries promoted during the Great Recession and its recovery period are still neoliberalist policies basically. This is prominently reflected in the following aspects.

First, the American Government has implemented large scale of rescue measures since the outbreak of the subprime crisis and financial crisis at the early stage of the Great Recession. The government was afraid that the bankruptcy of financial enterprises may drag down the production industry. It had to bail out big Banks, mortgage companies, insurance companies and others, which were on the brink of collapse. It is partly financed by high taxes on taxpayers, and mostly by borrowing. The huge losses of the vast majority of financial giants, with the exception of a few, such as Lehman Brothers, because of their greed and recklessness, were compensated by government rescues and ultimately paid by taxpayers. This is what other major developed countries did during the crisis. As a result, the debt in the USA and major capitalist countries soared to record levels since the Second World WarI, and government budget deficits ballooned. After coming out of the recession, the government started to implement the so-called “austerity” plan to reduce the budget deficit and government debt, cut government spending, especially government investment and social welfare spending, and raised taxes on working people. All these “austerity”

measures merely shifted the cost of the great recession onto the working class. The seemingly anti-liberal government intervention in the capitalist countries during the crisis and the recovery period is still a measure to maintain and compensate for the large capital by hard-earned money of the labor masses in essence. As for the economic effects of these measures, they seem to mitigate the damage of the crisis, but due to the excess capital that had not been fully destroyed and devalued, it is not conducive to the recovery of profit rates and the resumption of economic expansion. One of the inevitable consequences of rescuing the financial crisis was to turn corporate debt into national debt, and some European countries even developed a sovereign debt crisis that severely restricted government investment and prevented a rapid economic recovery. The compensation for the loss of crisis born by the broad working class will certainly weaken the purchasing power of the masses, which is also not conducive to the alleviation of the realization problem and the real recovery of the economy.

Second, a basic feature of the neoliberalism institution structure is to increase the rate of exploitation by strengthening the extraction of employed labor. Now, after the USA got out from the crisis in the second half of 2009 and entered the recovery phase, has this labor disadvantage improved? It seems not yet. According to the US official statistics alone, real wages for a wide range of workers have continued the downward and stagnant trend since the 1970s. Average real hourly earnings of production and non-supervisory employees (1982-1984 \$) are: \$8.85 in 2014, lower than \$8.88 of 2009; which rose to \$9.08 in 2015, but only \$0.2 more than that of 2009, and lower than \$9.26 in 1972. The average real weekly earnings of employees are: \$305.91 in 2015, which is only \$12 higher than that of 2009, but still about \$36 lower than that of 1972[19]. In the recovery stage, the stagnation of real wages of the vast number of employees has further expanded income inequality, severely restricting the purchasing power of ordinary residents, and the growth of consumer demand is bound to be sluggish. The average annual growth rate of personal consumption expenditures, the largest component of GDP, increased only 2.3 percent from 2010 to 2016. It is far lower than 4.4 percent in the 1980s, the periodic expansion during 1983–1989, 4.1 percent in 1990s, periodic expansion during 1992–2000 and 3.0 percent from 2002 to 2007[20]. The sluggish growth of consumer demand has become the main constraint that the US economic recovery has not been able to turn into an economic upsurge.

Third, another fundamental feature of the neoliberal institutional structure is the financialization of the economy. The development of financialization and virtualization of American economy once played a role in the long wave of expansion that started in the early 1980s, but the financial bubble formed and its burst also became an important factor that triggered the financial crisis and the “Great Recession.” The post-crisis rectification of the US financial sector was harsh, but the trend of the economy toward financialization does not appear to be reversing. In this crisis, the US Government not only saved the financial giants on a large scale through fiscal policy, but also saved the market through unconventional “monetary policy.” The main measure is monetary expansion, which has been followed by several rounds of so-called “quantitative easing” so as to cut interest rates. The interest rate on the three-year Treasury note dropped sharply from 4.41 in 2007 to 0.16 in 2009. After entering the recovery phase, the interest rate continued to fall to near zero. The average of 2011–2015 was only 0.06[21]. The Federal Reserve has been counting on this ultra-easing monetary policy to boost investment and consumption, so as to promote the economy growth, but it has not. Cheap and readily available dollars did encourage non-financial companies to borrow heavily, but they used much of their borrowed money to speculate on financial assets, buying back corporate shares, driving up stock prices and making financial profits. The result is the sluggish growth in the real economy and soaring stock prices. At the same time, the debt economy, accompanied by financialization, expanded further.

Total liabilities of US non-financial companies rose sharply to \$18.72 trillion in 2016 from \$12.91 trillion at the start of the financial crisis in 2007[22]. The federal government's own debt ballooned as a result of the rescue measures of the financial crisis. Between 2007 and 2016, federal government debt soared from \$8.95 trillion to \$19.45 trillion, and its ratio to GDP soared from 62.5 to 106.0 percent[23]. Such high debt is one of the main reasons why US companies and governments have been slow to invest in the real economy. It severely hampers the strong recovery.

In terms of market conditions, the decline in the growth rate of international trade after the Great Recession has not yet been reversed. During the long wave of expansion, higher import and export growth in the USA have declined sharply after the Great Recession. The growth rate of imports (goods and services) dropped from an average of 7.8 percent a year in 1983–2007 to 1.7 percent in 2008–2016. Growth in exports (goods and services) fell from an average of 6.5 percent a year to 3.0 percent over the same period. Moreover, the USA's export growth has slowed markedly during this period. In 2010 and 2011, the annual export growth rate was 11.9 and 6.9 percent, respectively. By 2015 and 2016, it had fallen to 0.1 and 0.4 percent, respectively[24]. The overall situation of the G7 is similar to that of the USA. The average annual export growth rate of the G7 fell from 5.7 percent in 1983–2007 to 2.4 percent in 2008–2015. The average annual growth rate of imports and exports fell from 5.9 to 2.2 percent[25]. For developed countries such as the USA, slowing import growth means weak domestic demand, while slowing export growth means a relatively smaller market share abroad. Their international competitiveness has not improved significantly during this recovery phase, and even relative declined compared to China and other newly industrialized countries. That leads their export markets have been squeezed. Instead of deeply reflecting on its own "industrial hollowness" and decline in competitiveness, and taking reform measures, the USA angered at the trading countries involved and embarked a countercurrent of "anti-globalization." The new President of the USA, Donald Trump, publicly advocates the protectionism policy, the "America first," provoking trade disputes with many countries. This is obviously not conducive to the healthy development of international trade. The depression of the world market will, in turn, be a constraint on the robust recovery in the developed world.

In short, from the perspective of the structural contradictions in the technological, institutional and market foundations, it seems that eight years after entering the recovery phase, the major capitalist countries have not yet undergone significant adjustment and transformation and formed the basic conditions for leaving the "long-term depression." Economic conditions in the USA appear to have improved since this year (2017). The GDP growth rate reached 3.1 percent in the second quarter and 3.3 percent in the third quarter, a significant rebound from the sluggish 1.2 percent in the first quarter and a relatively strong consecutive quarterly data in recent years. As a result of the improved state of the US economy and the impact of the tax reform bill's gradual implementation, Wall Street economists' expectations for US economic growth have clearly turned positive, seeing a real GDP growth of 2.5 percent in 2017, 2.6 percent in 2018 and 1.7 percent in 2019, according to the Wall Street journal website. Others even predict that the expansion will continue into 2020. Even extending into the second half of 2019, it would form the longest expansion cycle in the US history, and breaking the record for the duration of the economic boom set in the 1990s[26]. Let us leave these predictions to chance. Assuming all these optimistic predictions come true, this record expansion cycle is hardly called booming. Because even with these projections, the average annual growth rate of real GDP in the USA for the ten years from 2010 to 2019 is only 2.14 percent, well below the pace of periodic expansion phase in the 1970s, 1980s, 1990s and the first seven years of the new century. If such an expansion cycle is a record of duration, it is also one of the weakest cycles in history, and it is fair to call it a "sluggish" expansion cycle.

Considering the slow coordination of structural contradictions in developed countries, the long wave downswing may last for some time. But the specific year of recovery is hard to predict. Certainly, no matter how long the time is, depression or recession in a capitalist economy will not last forever. With the upsurge of the fourth industrial revolution, a relatively favorable institutional structure for capital accumulation was gradually formed, and the global market was further expanded, a new rising period of long wave will come. The gradual development of the fourth industrial revolution is certain, but the adjustment of the institutional structure is still uncertain. Against the backdrop of this “Great Recession” and “Long Depression,” there has been a significant political polarization in developed capitalist countries, with the traditional political elite being rejected and more voters turning to non-mainstream political figures. Political polarization is similar to what happened in the 1930s during the Great Depression. The reform of institutional structure depends largely on the class power contrast, the changes of the strength of political parties’ power and the political choice of the broad electorate in different countries. As for the expansion of world markets, despite the signs of revival in global trade in 2017, the growth rates are still far below the pre-crisis level, and threatened by “anti-globalization” protectionism. But the historical trend of globalization is irreversible, and the world economy has already been integrated. Emerging market economies represented by China are growing rapidly. In particular, the “Belt and Road” initiative proposed by China is promoting the economic construction of Asian, African and European countries, and also promoting the development of international trade and the expansion of the world market. In recent years, China’s economic development, mainly driven by domestic demand, has contributed more than 30 percent to world economic growth alone. The developed capitalist countries are more dependent on foreign markets today than ever before. The economic growth and market expansion of emerging industrialized economies and developing countries may provide favorable market conditions for developed capitalist countries to move into a new long wave of expansion.

Capitalist economy develops and evolves in the economic cycle and long-term fluctuations. From the actual evolution of global economy and politics in recent decades, the world capitalist economy shows a clear trend of decline. Even during the long wave upswing from 1983 to 2007, developed countries such as the USA were in relative decline. If you look at the major capitalist countries today, they are not only economically hobbled, but also politically chaotic. The US President D. Trump has stirred up national infighting, social division and allies disputes with his freewheeling speeches and policies. His business-like approach may help domestic manufacturing investment and job growth in the short term, but it remains to be seen whether his “America first” approach will really drive many fundamental structural reforms. Europe is in multiple predicaments: sovereign debt crisis, Brexit, the rise of separatism, constant terrorist attacks, refugee crisis and populism is rampant. Japan’s economy has been sluggish for years. Compared with the economic and social stability and prosperity in the “Golden Age” after the war, developed countries such as the USA, Europe and Japan are no longer the same. In the evolution of world economic and political situation, the rise of socialist China is of special significance. After decades of rapid development, China has entered the ranks of middle- and high-income countries. The 19th National Congress of the Communist Party of China was just convened successfully. It has set well-defined objectives and a clear roadmap in a bid to make China become a modern and powerful socialist country by the middle of the century. No power in the world can block the rise of socialist China and its rise will be a fundamental guarantee for the victory of the international communist movement. China’s economy has been closely linked with the global economy. It is very important for China to correctly understand the basic situation of the world capitalist economic development. During the long wave of expansion in

western countries from the early 1980s to 2007, China's economy achieved rapid growth for nearly 30 years. However, since the global financial and economic crisis broke out in 2008 and turned into a long wave of depression, the international political, economic and trade environment has undergone tremendous changes. We should have a clear understanding of this special historical stage of capitalist evolution, and make effective use and positive response.

Notes

1. Similar to the "Social Structure of Accumulation" School, the French "Regulation School" also emphasizes institutional analysis.
2. *Economic Reports of the President* (2009), p. 287 Table B-4, p. 334 Table B-42, p. 357 Table B-63. The rate of capital accumulation is represented by the growth rate of non-residential fixed assets investment, and the inflation rate is represented by the rate of change in the consumer price index. The annual average figure is calculated according to the values of each year.
3. *Economic Reports of the President* (2001), Statistical Appendix, p. 330 Table B-47.
4. Calculation basis: US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
5. Calculation basis: *Economic Reports of the President* (2015), Statistical Appendix, p. 402 Table B-15, p. 403 Table B-16.
6. Calculation basis: *Economic Reports of the President* (2013), Statistical Appendix, p. 324 Table B-2; *Economic Reports of the President* (2015), Statistical Appendix, p. 402 Table B-15, p. 403 Table B-16.
7. *Economic Reports of the President* (2013), Statistical Appendix, p. 387 Table B-54.
8. Calculation basis: *Economic Reports of the President* (2009), Statistical Appendix, p. 402 Table B-103.
9. Calculation basis: P. Armstrong *et al.*: *Capitalism since World War II: The Making and Breakup of the Great Boom*, Chinese Version, China Social Sciences Press 1991, p. 434 Table-A1.
10. US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
11. US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
12. Calculation basis: US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
13. Calculation basis: OECD Economic Outlook: Statistics and Projections (2017), <https://data.oecd.org/gdp/real-gdp-forecast.htm#indicator-chart>
14. Calculation basis: US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
15. Calculation basis: US Bureau of Labor Statistics (June 5, 2017): "Labor Productivity (output per hour): non-farm Business Sector, all Employed Persons, Percent Change from Previous Quarter at Annual Rate."
16. Calculation basis: US Bureau of Labor Statistics (February 8, 2017): "Employment status at the civilian noninstitutional population, 1946 to date," www.bls.gov/cps/documentation.htm#comp
17. Calculation basis: US Bureau of Labor Statistics (February 8, 2017): "Employment status at the civilian noninstitutional population, 1946 to date."
18. Calculation basis: US Bureau of Labor Statistics (February 8, 2017): "Employment status at the civilian noninstitutional population, 1946 to date."

19. *Economic Reports of the President* (2017), Statistical Appendix, p. 582 Table B-15.
20. Calculation basis: US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
21. *Economic Reports of the President* (2017), Statistical Appendix, p. 592 Table B-25.
22. Non-financial Corporate Business; Total Liabilities: Federal Reserve Bank of St. Louis (September 2017), <https://fred.stlouisfed.org/series/TLBSNNCB>
23. *Economic Reports of the President* (2017), Statistical Appendix, p. 584 Table B-17, p. 585 Table B-18. The 2016 figures are estimates.
24. US Bureau of Economic Analysis (June 29, 2017): "Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product."
25. Calculation basis: Database of the World Bank (September 2017), <https://databank.worldbank.org/data/reports.aspx?suorce=world-development-indicators>
26. Re-quoted from: Reference News, page 4 of December 17, 2017, the age 4 of December 27, 2017.

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