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The Cyclical Fluctuation of U.S. Public Higher Education Institutions Establishment Impact by the Kandretieff Cyclical Wave

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Abstract

In the past several centuries, 566 public four-years higher education institutions were founded in the United States. Meanwhile, the expansion of higher education and economic development has been apparent across the U.S. higher education history. This study provided a detailed comparative look at Braudel's (1972) long term theory that explores the relationship between the cycle of public colleges' and universities' establishments and socio-economic environments. The result shows that the rise and fall trends of public higher education development are closely associated with the economic environment in the U.S. It is expected that this research could help higher education policymakers and administrators better understand the functions of the economic environment on higher education development and encourage them to make feasible decisions of higher education development to adapt to the economic environment.

Keywords: Higher Education History, Public Colleges, Kandretieff Cyclical Wave

1. Introduction

Public colleges and universities are regarded as essential components of the U.S. higher education system. The standard explanation for the distinction between public and private higher education institutions originates from neo-classical economics and statist political perspectives (Marginson, 2007). According to the distinction of ownership, higher education institutions can be divided into public and private sectors (Levy, 1986; Varghese, 2004). Although private higher education institutions have dominated the U.S.s for much of its history, more than 80 percents of undergraduate students attend public colleges or universities today (Levy, 1986; Altbach & Levy, 2005). For example, the NCES 2018 report noted that 14.53 million undergraduate students have enrolled in public colleges or universities in the U.S. (Snyder, De Brey, & Dillow, 2019). In some sense, the development of public higher education promotes college students' enrollment growth and provides continual economic dynamics on intellectual resources. UNESCO's (2004) report demonstrated that the enrollment ratios are rapidly climbing past 50 and even 80 percent in some industrialized countries, foreshadowing the possibility of universal higher education. Therefore, most industrialized countries have initiated increases in higher education investment in the new millennium (Levy, 1986).

The budget resources directly decide the types of higher education institutions. In contrast to the private higher education institutions, public higher education institutions are a kind of non-market driven, non-profit, and state-owned organizations (Marginson, 2007). In terms of the U.S. public higher education system, the main financial resources come from the general state subsidy in direct state or federal appropriations to public colleges or universities (Heller, 2001). The traditions of state support for higher education remain strong from past to present in the United States (Altbach & Levy, 2005).

Three clarity features were summarized that represented the U.S. higher education system: affordability, accessibility, and accountability (Heller, 2001). Initially, public higher education institutions take responsibility for the community at local, state, and national levels since they are funded publicly (Zook, 1947). Public colleges and universities maintain an affordable tuition rate through the general state subsidy (Heller, 2001). Additionally, the public higher education system tends to ensure equal opportunity to attend higher education (Heller, 2001). Thus, the second feature supports that public colleges and universities provide more opportunities for individuals to access higher education resources without regard to their backgrounds (Bastedo & Gumport, 2003). Thirdly, public higher education institutions have the accountability to accept the performance assessment by the state government (Heller, 2001).

Based on public higher education institutions' features on finance, mission and accountability, public colleges and universities have a close relationship with political powers such as budget, power of government, professionalism of legislature, and governance structure (Tandberg, 2010). Keep and Mayhew (2004) described that the government supporting the development of public higher education often depends on two basic visions: 1) it is necessary for economic development; 2) it can improve the financial situations of people who come from the lower socio-economical background. In other words, political power is one important dynamic power that affects the public higher education system's development.

Additionally, public higher education development is also associated with the economic environment. Scholars (Burkhalter, 1996; Hensley, Galilee-Belfer, & Lee, 2013) stated that the public higher education system responds actively to the change of the surrounding economic environment, and leaders of public colleges usually craft flexible plans to prepare college graduates for their respective careers and roles within the new global economy. Thus, it seems that public higher education institutions engage in providing qualified talents to meet economic development demands. For example, Marginson's (2010) study identified higher education as the research and innovation center for developing the global economy. Pegkas and Tsamadias (2014) explored the relationship between higher education development and economic growth, and their results indicated that the expansion of higher education is strongly associated with economic growth statistically. Mallick and Dash (2015) also proved that the increase of higher education expenditure creates better human resources development and contributes to economic growth. Public colleges attempt to play a crucial role in developing high tech, new generation knowledge creation, training intellectual labor, and the spinning-off of new business ventures (Gastells & Hall, 1994). Therefore, it is reasonable to consider that public higher education exerts positive effects on maintaining economic prosperity through knowledge communication and innovation.

However, it is assumed that mutual influence occurs between the economic environment and the public higher education development. Public higher education institutions are frequently required to reform due to the changes of the economic environment (Brown & Heaney, 1997). On the other side, the economic environment is also supposed to affect the development of public higher education. Humphreys (2000) found that "1% percent change in real per capita income was, on average, associated with a 1.39% change in real state appropriations per full-time equivalent student enrolled" (p. 398). Although many studies show that public higher education development would promote economic growth, limited studies have discussed how the economic environment would influence public higher education institutions. As a result, this study explores the relationship between the economic environment and the expansion or constriction of U.S. public higher education institutions from a historical chronicle perspective through the following questions:

- 1) What are the distributions of the establishment years of U.S. public universities on the historical time series?
- 2) How has the economic environment impacted the increasing or decreasing trends of the number of

public universities in the U.S. higher education history?

2. Theoretical Framework

This study utilizes Braudel's Long Term Theory to explore the similarities and differences of economic development cycles and the establishment of public higher education institutions in the long time series. According to Braudel's theory (1976), social time is divided into three categories: the temporality of events, intermediary duration of conjunctures, and long-term structural time (Sousa, 2006). Temporality events refer to "innovations, inventions, episodes, individual stories, and fast-changing transformations" (Sousa, 2006, p. 375). Intermediary conjuncture is defined as "the short-run grouping of events for a common purpose" (Savitt, 2000, p. 91). In contrast to temporality events and intermediary conjuncture, long term time is a structural time that incorporates cyclical change and multiple events (Sousa, 2006). "The long term time, intermediary conjuncture duration, and the event or more properly the short term are regarded as a guide to historical analysis and reconstruction" (Lee, 2012, p. 15).

Temporality events include daily episodes and individual actions in human history (Sousa, 2006), while intermediary duration of conjunctures usually examines the set of events such as in the Industrial Revolution (Savitt, 2000). Braudel (1972) considered that historical event selection is based on historical studies' positive or negative preferences. Therefore, in contrast to the traditional historical perspective, the long-term time theory emphasizes the cycle, trends, regime, or cultural movements that are supposed to be meaningful in 10, 25, or even 50 years (Sousa, 2006). Lee (2012), therefore, concluded that "Braudel presented an in-depth clarification of his idea of time as a social structure rather than a simple chronological parameter" (p. 3). In some sense, this theory promotes historical research focusing on the trends or cycle of historical chronicle time series and analyzing history in a long term structural perspective.

Kondratieff's theory, which represents the long cycle of the capitalism economy, was designed based on Braudel's Long Term Theory (Santamaria & Bailey, 1984). Taylor (1988) considered that "the realization of a time series is the linear combination of a linear trend, nearly periodic components, and random fluctuations" (p. 413). Nikolay Kondratieff, a Russian economist, introduced the long big cycle of capitalism economy, which is described as the long wave cycle of capitalism economy development from 1780s to 1920s (Kondratieff, 1925, cited in Grinin, Devezas & Korotayev, 2012). Nikolai Kondratieff observed some economic indicators' historical record then illustrated that a forty-to-sixty-year economical cyclical fluctuation period from 1780 to 1920 existed (Korotayev & Tsirel, 2010). To some extent, Kondratieff's theory indicated that the capitalism economy existed in the long cyclical fluctuation. That is, the fluctuation of the U.S. economy is caused by some kind of cyclical process (Taylor, 1988). Table 1 showed the original findings of Kondratieff's capitalism long wave cycle from 1780s – 1920s. After 1920, several studies developed more long waves based on his theory. Grinin, Devezas & Korotayev (2012) summarized various studies toward Kondratieff's waves at the post-Kondratieff's era and provided the last three waves in 2010 (see Table 2).

Table 1. Kondratieff Cycles; Source: Kondratieff (1935).

		Start	End
First Long Wave	Rising Phase	1780-1790	1810-1817
	Declining Phase	1810-1817	1844-1851
Second Long Wave	Rising Phase	1844-1851	1870-1875
	Declining Phase	1870-1875	1890-1896
Third Long Wave	Rising Phase	1890-1896	1914-1920
	Declining Phase	1914-1920	

Table 2 Post-Kondratieff Long Waves and Phases Source: Grinin, Devezas & Korotayev (2012)

		Start	End
Four Long Wave	Rising Phase	1890-1896	1914-1920
	Declining Phase	From 1914 to 1928/29	1939-1950
Five Long Wave	Rising Phase	1939-1950	1968-1977
	Declining Phase	1968-1974	1984-1991
Six Long Wave	Rising Phase	1984-1991	2008-2010
	Declining Phase	2008-2010	

3. Method

This study used 566 U.S. four-year public universities that were funded by states and/or federal government as samples. Data of the establishment year of four-year public universities or colleges was collected from College Blue Book: Narrative Description (2009). Each public four-year higher education institution among 50 states and 3 oversea districts was tabulated. Only 11 public higher education institutions were established from 1693 to 1789, and they were distributed in 96 years. These 11 higher education institutions supported by state or federal were integrated into one historical period. The 10 year time interval set for each historical period starts in the 1800s. The establishment numbers of four-years public higher education institutions were positioned at different 10 year periods on the time series. The timeline graph was crafted according to the distribution of public college establishment numbers in different historical periods. After that, the comparative study was conducted into the timeline of the establishment number of public higher education institutions and Kandretieff's Cyclical Wave.

Scholars (Esser & Vliegenthart, 2017) noted that "Comparative research is a combination substance (specific objects of investigation studied in different macro-level contexts) and method (identification of differences and similarities following established rules and using equivalent concepts)" (p. 4). Comparative research aims to explore the differences and similarities and establish the universal social pattern across different contexts (Mills, Van de Bunt, & De Bruijn, 2006). Therefore, this study compares the similarities and differences of the wave crest and trough of U.S. public higher education institutions' chronicle timeline and the Kandretieff Cyclical Wave.

4. Findings

RQ1 What are the distributions of the establishment years of U.S. public universities on the historical time series?

Most of the public universities were concentrated in New York (32), California (30), Texas (38), Pennsylvania (29), Georgia (21), and Ohio (18), respectively. Compared to other states, these states have more public education institutions in the U.S. The number of four-year public colleges and universities located in these four states occupied beyond 25% of the total number of public higher education institutions in the U.S. (see Table 3).

Table 3 The number of public higher education institutions in U.S.

State	College Number	State	College Number	State	College Number
Alabama	16	Kentucky	8	Ohio	18
Alaska	3	Louisiana	14	Oklahoma	14

Arizona	5	Maine	8	Oregon	8
Arkansas	11	Maryland	12	Pennsylvania	29
California	30	Massachusetts	13	Puerto Rico	12
Colorado	14	Michigan	15	Rhode Island	15
Connecticut	7	Minnesota	11	South Dakota	6
Delaware	2	Mississippi	9	Tennessee	10
District of Columbia	1	Missouri	13	Texas	38
Florida	12	Montana	6	Utah	4
Georgia	21	Nebraska	7	Vermont	5
Guam	1	Nevada	2	Virgin Islands	1
Hawaii	3	New Hampshire	4	Virginia	15
Idaho	4	New Jersey	13	Washington	6
Illinois	12	New Mexico	6	West Virginia	10
Indiana	14	New York	32	Wisconsin	13
Iowa	3	North Carolina	16	Wyoming	1
Kansas	8	North Dakota	6		

The majority of higher education institutions were established between the 1850s to the 1970s. Four hundred and eighty-nine four year state or federal supported higher education institutions were established during this period, and the wave peak points appeared in three different periods: 1850 – 1870 (75 public colleges and universities), 1880 – 1910 (164 public colleges and universities), and 1950-1970 (105 public colleges and universities) (see Table 4).

From 1850 to 1870, 75 state or federal supported higher education institutions were founded. Following this period, 164 public colleges and universities were established from 1880 to 1910. When it came to the 1950s to the 1970s, 105 state or federal supported higher education institutions were established.

Table 4 The Distribution of Establishment Years among four year Public Universities and Colleges

Historical Period	College Number	Historical Period	College Number
1693-1798	11	1901-1910	52
1800-1810	3	1911-1920	30
1811-1820	5	1921-1930	34
1821-1830	7	1931-1940	15
1831-1840	14	1941-1950	29
1841-1850	10	1951-1960	36
1851-1860	26	1961-1970	69
1861-1870	49	1971-1980	19

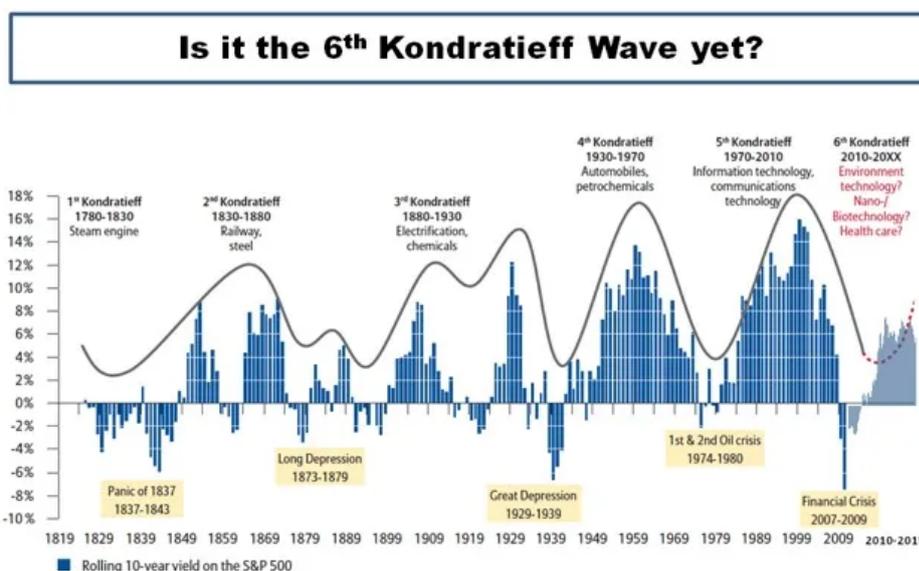
1871-1880	37	1981-1990	4
1881-1890	58	1991-2000	4
1891-1900	54		

RQ2 How has the economic environment impacted the increasing or decreasing trends of the number of public universities in the U.S. high education history?

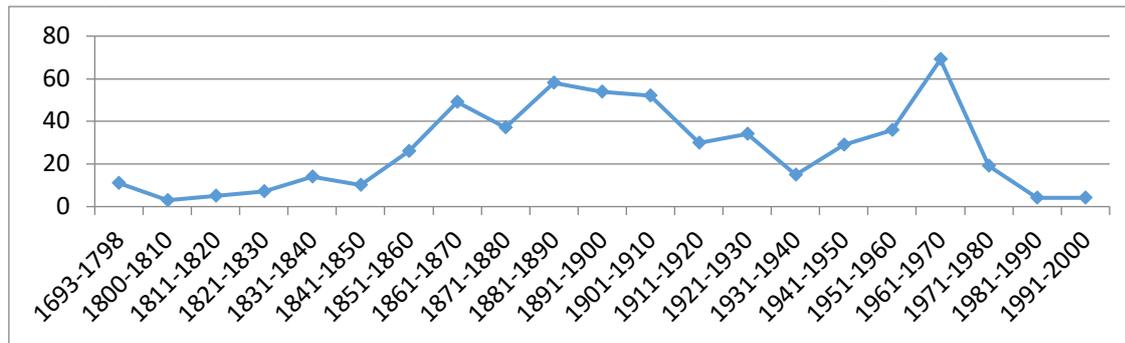
A comparative study was conducted between the Kondratieff Wave and the time series of the establishment years of four year public higher education institutions. Based on Kondratieff's long term economic cyclical theory, Investors (2010) summarized and crafted five cyclical economic waves from the 1780s to 2010, and the wave crest appeared in 1830-1880, 1880-1930, 1930-1970, and 1970-2010 (see Line Graph 1). Numbers among public colleges and universities for each ten-year interval were extended to the time series from 1800 to 2000 (see Line Graph 2).

Based on comparative observations, results show that the rise and fall trends of public colleges' and universities' establishment numbers are associated with the Kondratieff Cyclical Wave fluctuation. Specifically, according to the chronicle timeline of Kondratieff's Cyclical Wave, the capitalism economy underwent the second rising phase that triggered the technology innovation on railway and steel from 1850 to 1870. Meanwhile, 65 public higher education institutions were established during this period, and the establishment number of public colleges and universities occupied 11%. In terms of 1880-1930, the capitalist economy embraced the third rise phase promoted by electronic and chemical industries. At the same time, the establishment number of public higher education institutions reached 228. This number occupied 40% of the total number of public high education institutions. From 1950 to 1970, the capitalism economy returned to the rise phase on Kondratieff's Cyclical Wave attributed to information technology advancement. The public higher education welcomed the last wave of expansion with 124 public higher education institutions founded. This number took up 22% of the total number of public colleges and universities. Based on the comparative results, the fluctuation of the timeline of the establishment number of public colleges and universities matches the Kondratieff Cyclical Wave. It is estimated that the cyclical fluctuation of public higher education institutions' establishment numbers is influenced by the change of economic environment in U.S. higher education history.

Line Graph 1 Kondratieff Cyclical Wave Source: Allianz Global Investors (2010, p. 6).



Line Graph 2 The time series of establishment number among four year public higher education institutions



5. Discussion

The comparative findings illustrate that public colleges and universities' expansion and constriction are usually associated with economic cycles in the past several centuries. Windolf (1992) analyzed the relationship between indicators of the enrollment rate and the Gross National Products. They concluded that the expansion of higher education fluctuates about 20 years in U.S. history. This study indicates that the establishment number of public higher education institutions exist in 50 year cycles following the economic cyclical changes. Thus, from the perspective of numerical college size, higher education expansion's cycle remains around 50 year terms. Additionally, the changes in the economic environment would lead to institutional transitions. Windolf (1992) noted that institutional change consists of four phases over a length of 60 years. This institutional transition cyclical period is similar to the Kandretieff Cyclical Wave fluctuation cycle and the cycle of public colleges' and universities' establishment numbers. The higher education system is one of the important components of the social regime. Thus, it is estimated that the economic environment encourages institutional change and then affects the public higher education system's reform and expansion.

In general, higher education expansion is natural to connect with education reform. Shavit (2007) described that education reform pushed the expansion of higher education and promoted inequality improvement. Some previous studies discussed that the turndown of the economy had a strong relationship with higher education reform. For example, Forrester (1976) and Simsek (2005) revealed that the large scale of higher education reform of developed countries usually occurred in the declining phase of the Kandretieff Cyclical Wave western history. This study's comparative results show that the number of public colleges has constricted on the Kandretieff Cyclical Wave's declining phase. However, the relationship between education reform and higher education expansion is against the Shavit (2007) conclusion. In other words, if the higher education reforms occurred in the decline phase of the Kandretieff Cyclical Wave, the higher education reform may not be able to change the number of public higher education institutions. Therefore, political power is not the sole dynamic to affect the expansion of public higher education institutions.

Additionally, the public higher education system owns the innate relationship with political power. The development of public higher education is closely bound up with the government's public expenditure as the state, and federal appropriations are the major financial resources for public colleges and universities. Carpentier (2003) and Nunes (2003) examined the effects of expanded public expenditure on education from the long term theory, and they indicated that the economic growth brought about the increase of government budget, as well as the increase of the public expenditure on education that will promote economic growth. It is reasonable to estimate that when the economic development enters into the rise phase of the Kandretieff Cyclical Wave, the public expenditure on education will increase following economic prosperity. Furthermore, the scale of higher education will be expanded. Findings of this study support Carpentier's (2003) and Nunes' (2003) statements that the numerical expansion of higher education institutions was the direct result of public expenditure growth when the capitalist economy entered into the rise phase. As a result, the expansion of higher education relies on support from the government under economic growth.

6. Conclusion and Implications

In summary, the present study indicates that the establishment events of public higher institutions exist as cyclical fluctuation on the historical time series, and this cyclical fluctuation reflects the Kandretieff Cyclical Wave model. Additionally, there is a symbiotic relationship pattern between the economic environment and the higher education expansion. That is, in the past 200 years, the stability or prosperity of the economic environment was a kind of impetus to push the growth of public colleges and universities.

The past historical evidence toward the higher education development and the economic environment provide references for policymakers, administrators, and scholars to find the routine principles and pattern of the current policymaking. Understanding the routine, principles, and patterns that hide among higher education history evidence could help higher education policymakers and administrators design optimal education policy. It is expected that this study could provide a macro-historical image towards the development of public higher education institutions and the economical environment in the U.S.

It is also expected that this study would provide related historical references to help public policymakers and administrators create feasible policies for higher education that adapt to the current economic development situation. For example, as the public expenditure is affected by economic growth, the government should consider increasing the investment on higher education during the continual rising phase of economic development in order to realize the expansion plan. The new public colleges or universities should consider establishing during the rising economic phase. Since the reforms of higher education are associated with the changes in the economic environment, during the economic turndown period, education reforms should be applied to maintain the current scale. The education reforms could also help the higher education system better prepare for the next new economic rising phase and avoid the intellectual shortage due to the higher education constriction for the next rise cycle. In other words, policymakers and administrators could grasp and utilize the optimal time according to the cyclical transitions of the economic and higher education development to push reasonable budget allocation policy and education reform.

7. Limitations and Future Study

Some limitations exist in this study. Initially, this study used the Kandretieff Cyclical Wave to describe the capitalist economic cycle. However, some scholars disputed the authenticity of the Kandretieff Cyclical Wave. For example, Rothbard (1984) and Van Ewijk (1981) argued that there was no cyclical wave of capitalist economic development. Secondly, this study only examined the economic influence on the establishment number of public higher education institutions in U.S. higher education history. Several social or political events could possibly affect the expansion of the U.S. public higher education institutions, such as the Morrill Land-Grant Act (1862), the Servicemen's Readjustment Act (1944), and the National Defense Act (1958). These three significant milestone acts would promote higher education expansion in U.S. higher education history (Gavins, 2016; Herren & Hillison, 1996; Jolly, 2009). Therefore, future study should involve social and political factors to further explore the hiding codes that influence U.S. public higher education expansion.

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